LOSTWOOD NATIONAL WILDLIFE REFUGE
Kenmare, North Dakota

ANNUAL NARRATIVE REPORT
Calendar Year 1987

U.S. Department of the Interior Fish and Wildlife Service NATIONAL WILDLIFE REFUGE SYSTEM

# REVIEW AND APPROVALS

## LOSTWOOD NATIONAL WILDLIFE REFUGE

Kenmare, North Dakota

# ANNUAL NARRATIVE REPORT

Calendar Year 1987

Refuge Manager

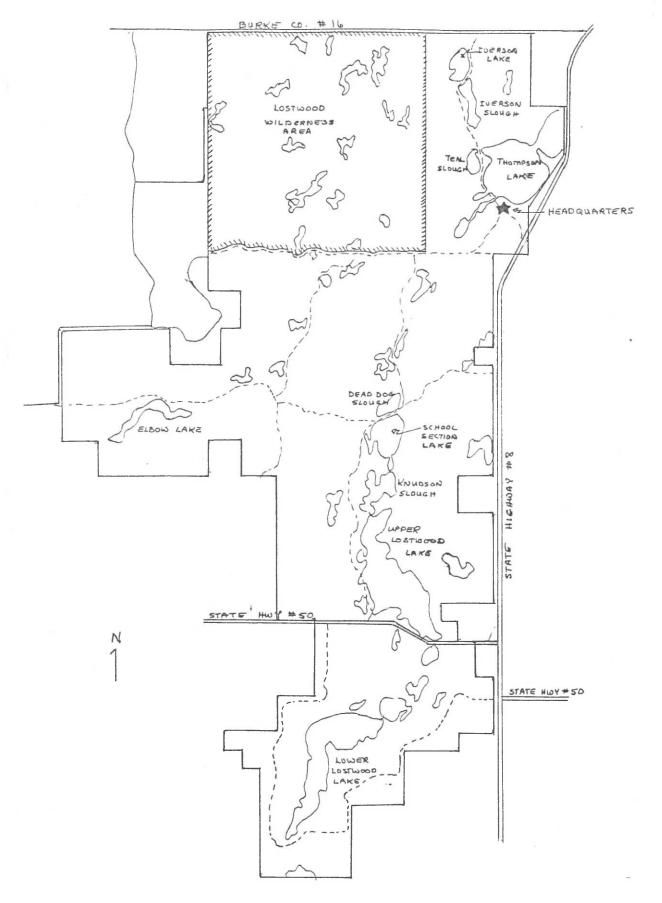
Refuge Supervisor

#### Introduction

The 26,747-acre Lostwood National Wildlife Refuge lies in northwestern North Dakota, 23 miles south of the Canadian border and 70 miles east of Montana. It was established in 1935 by Executive Order 7171 as a "...refuge and breeding ground for migratory birds and other wildlife..." within Burke and Mountrail Counties on the Missouri du Coteau, (a terminal moraine deposited by the Wisconsin glacier about 10,000 years ago). Refuge topography is rolling to steep hills covered with native (70%) and tame (30%) grasslands, small patches of aspen (about 1% of the refuge), and numerous wetlands. This is the largest contiguous block of native grassland under U.S. Fish and Wildlife Service ownership in the pothole region of Minnesota, Montana, and North and South Dakota. The hills are mostly covered with western snowberry, needle-and-thread, green needlegrass, western wheatgrass, blue grama, plains muhly, small-flowered aster, northern bedstraw, goldenrod, wild licorice, meadow anemone, white sage and others. Native resident fauna include sharp-tailed grouse, white-tailed deer, beaver, coyote, and white-tailed jackrabbit. The native migratory fauna include waterfowl (mallard, wigeon, gadwall, blue-winged teal, giant Canada goose and others), shorebirds (upland sandpiper, marbled godwit, avocet, piping plover, and others), passerines (clay-colored sparrow, Sprague's pipit, sharp-talled sparrow, Baird's sparrow and others), and raptors (red-tailed hawk, Swainson's hawk, northern harrier, great horned owl, short-eared owl and others). The mixed grass and prairie community is currently enhanced mainly by prescribed burning.

Public use facilities on the refuge include a self-guided auto route, a hiking trail, and a photo blind on a sharp-tailed grouse lek. Birding, photography, and hunting for grouse, Hungarian partridge, and deer are the main public use activities. In 1975, the 5577 acre Lostwood Wilderness Area was established by P.L. 93-632, 12, Section 1 (d) (12).

On 1 July 1973, Lostwood NWR, staffed with a resident manager and one maintenance personnel, was placed under the administration of the Des Lacs Complex, headquartered at Des Lacs NWR in Kenmare, North Dakota.



# INTRODUCTION

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#### A. HIGHLIGHTS

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Waterfowl numbers and production appears up from 1986, even in a very dry year; early spring was the key	57-58
No significant runoff since 1979, and low runoff and no spring rainfall has produced wetland conditions nearly as dry as the 1930s	25-29
Rain and wetland water quality analysis continues	30
Class I air quality data interpretation received	47-48
Piping plover research begun	52-56
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### B. CLIMATIC CONDITIONS

November through February, 1986-87, brought above normal amounts of snowfall, but it never had a chance to accumulate because temperatures would rise above freezing after each snowfall and melt the snow into topsoils. Each winter month had the following number of days above freezing (month/# of days): Nov/15, Dec/16, Jan/12, Feb/16, and Mar/19. By the end of February there was no snow left on the ground for any runoff into wetlands. Two March snowstorms, totalling 9.75 inches of snow (1.66 inches of water), helped the situation by filling most upper and middle watershed wetlands, but little reached lower watershed wetlands - the brood waters.

The year continued with abnormally high temperatures and low moisture. Six months of 1987 had maximum temperatures of  $90^{\circ}$  F or above and minumum temperatures above freezing. Temperatures continued to be above normal throughout the rest of the year.

Annual precipitation in 1987 was 4.44 inches below normal (Table 1). Precipitation in April, May, and June was only 2.79 inches: the average is 6.91 inches. July was a saver with 3.83 inches, but the rest of the year resembled the spring trend. The topsoils were so dry by freeze-up that they did not freeze due to lack of moisture.

Table 1. Monthly weather during 1987, and 45-year average precipitation.

Temperature (°F)*						ecipitatio	on (in.)
Month	Max.	Ave. max.	Min.	Ave. min.		Rain and melt	45-yr ave.
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	51 47 68 91 92 97 95 95 90 84 67 56	29 35 36 61 73 82 79 76 72 58 47 33	-12 -9 -4 18 32 40 43 35 33 13 7	5 16 18 35 46 53 55 50 44 29 21 15		0.34* 1.69* 1.66* 0.10* 1.80 0.89 3.83 0.73 0.66 0.30 0.16* T*	0.43 0.52 0.58 1.32 2.04 3.55 2.29 2.05 1.90 0.91 0.51 0.50

\*Records from the Des Lacs NWR weather station.

### C. Land Acquisition

### 3.Other

One portion of the refuge boundary fence along State Highway #8 curves around an old highway grade (just north of the Art Lindberg farmstead). Straightening of the boundary fence was desired, so contacts were made to North Dakota State Highway Department and Burke County Commissioners to determined who owned the old roadbed and the wetland between the new (rebuilt about 1960) and old roadbed, and if we could acquire these tracts of land. The State Highway Department, contacted first, expressed abandoned right-of-ways are transferred to the countles. Therefore, Burke County Commissioners were contacted. They had no objection to the federal government acquiring the acreage and suggested a Quick Claim Deed for transferring the land. Unfortunately, no ownership records were found for the various small tracts of land. With the situation only getting more confusing, the land acquisition office In Bismarck became involved. They resolved the confusion, but could not resolve the problem because it is unknown who, the county or state, owns the old roadbed (records were lost in a fire). No one can transfer the 1.28 acres (old roadbed) to us without extensive time and money involved to resolve ownership. Since both potential party owners desired the federal government to own the tract, the fence was rebuilt straight, incorporating the old roadbed and wetland into the refuge boundary (map 2).

The above "highway wetland" is partially drained by a deep cut in the highway ditch. The State Highway Department claimed that two feet of fill could be added without affecting their roadbed and the opposite landowner. However we checked and found that not even four inches of fill could be added without backing water onto the adjacent landowner. Consequently no fill was added.

## D. PLANNING

## 2. Management Plan

The annual fire plan was completed.

A report was written entitled "Monitoring and Research Needs on Lostwood National Wildlife Refuge: Pollutants Associated with Fossil Fuel Development in Western North Dakota." The report was written to draw attention to increasing problems of acid deposition, and how it could affect prairie wetlands, and how oil well development could affect wetlands. It was sent to Denver and other offices for comments, and to seek funding. Since acid deposition, or "acid rain," is a global problem, it is important to determine if acid deposition is affecting prairie wetlands (see page 30 for more detail), and ultimately waterfowl. There is no other place in North Dakota where air, rain, snow, and wetland water quality is being evaluated for acid deposition.

## 4. Compliance with Environmental and Cultural Resource Mandates

Tepee rings, old settler trails, and homestead sites are marked on aerial photographs while vegetatively mapping LNWR.

#### 5. Research and Investigation

#### a. Northern Prairie Wildlife Research Center

The ongoing Northern Prairie Wildlife Research Center (NPWRC) research project, explained in detail in the 1981 narrative, is entitled:

a. Project 924: Effects of land management practices on upland habitats and wildlife populations in the glaciated prairie region.

Work Unit 924.02: "The effects of rest rotation grazing and prescribed burning on the mixed grass prairie community and wildlife population in the glaciated prairie region."

All study fields were rested in 1987; treatments of all fields from 1980-1987 are shown in Table 2.

Table 2. Four vegetation treatments applied to 12 research fields, 3 fields/treatment, from 1980-1987 on Lostwood NWR.

Year	Spring Burn	Pristine <sup>a</sup>	Spring Grazed <sup>a</sup>	Control
1980	Rest	Rest	Rest	Rest
1981	Rest	Rest	Rest	Rest
1982	Jun Burn	Sum Burn	1 May-15 Jun	Rest
1983	Rest	1 May-15 Jun	1 May-15 Jun	Rest
1984	Jun Burn	Rest	1 May-15 Jun	Rest
1985	Rest	Sum Burn	Rest	Rest
1986	Jun Burn	1 May-15 Jun	Rest	Rest
1987	Rest	Rest	Rest	Rest

(a) Grazed at 1 acre/AUM.

Officially, the project was to end in 1987, but six of the twelve study fields recieved their last treatments in 1986. This means that six areas searched for nests in 1987 had no previous rest; at least two years of rest is essential to determine the attractiveness of an area to waterfowl and other upland nesting species. An example of this importance is shown in the 1987 nest data between Research Fields and Teal Slough Burn. The 1987 nesting results (ducks and grouse) on research fields (1127 acres total) and a 633-acre area within the Teal Slough Burn (prescribe-burned in 1981 and 1983) are shown in Table 3. Both areas, similar in habitat composition, were nest-dragged by NPWRC crews.

Page 5

Table 3. Duck and sharp-tailed grouse nesting on research fields (1127 acres) and Teal Slough Burn (633 acres) on Lostwood NWR, 1987.

	Nu	mber of	% Suc	cess <sup>b</sup>		
	Total	Aban.	Hat.	Dest.	App.	May.
Research fields						
Ducks	276 <sup>c</sup>	7	179	90	66.5	47.1
S-t grouse	25	1	21	3	87.5	74.9
Teal Slough Burn						*
Ducks	272 <sup>c</sup>	8	169	95	64.0	47.4
S-t grouse	24	0	20	4	83.0	57.5

(a) All data are from NPWRC. Total is actual number of nests found, excluding nests inadvertantly damaged by researchers, abandoned is number of nest abandoned for unknown reasons (excluded from caluculating % success), hatched nests are normal hatched nests, and destroyed nests are those known destroyed by predators. (b) Percent success, apparent and Mayfield, calculated by NPWRC. (c) Research fields had 74 mallard nests (about 69% apparent success), and Teal Slough field had 115 mallard nests (about 58% apparent success).

The nesting density is good on the Teal Slough Burn area after three years of rest. Most litter on the research fields was removed by treatments (burning or grazing) and requires rest periods to rebuild, and provide cover. Treatments had to be spread out more than planned, thus post-treatment monitoring is extended for two additional years beyond what was planned.

(KEEP IN MIND: complete litter removal by various treatment methods was one of the research goals, and is being used to assess renovation methods for restoring Lostwood's native prairie back onto a mixture of native grasses and forbs, and about 20% western snowberry. Lostwood's native prairie, at present, is dominated with decadent western snowberry, Kentucky bluegrass, and smooth brome; brome is taking over all native plants - brush, grasses, and forbs. Once brome begins to invade into brush, it takes from 5-10 years for takeover to be completed under idle management. To have Lostwood end up with -In theory- 26,747 acres of smooth brome is not desirable on a National Wildlife Refuge thats maintaining or enhancing native resources.)

Litter removal temporarily reduces the attractiveness of an area to nesting waterfowl. To determine the actual response of waterfowl to the treatments, monitoring must continue in post-treatment years for at least two years. We recognize the importance of continued monitoring of research fields when we studied the Teal Slough Burn area. On this area, there were three complete growing season after the last prescribed burn. The litter stands upright in tent canopy fashion instead of laying flat, as in areas idle for many years (except for western snowberry). Compared with the research fields, the nesting density is about twice as high on Teal Slough, while hatching success is nearly identical. At least two more years of monitoring of research fields is needed to fully evaluate the effects of treatments on ducks, grouse, and other ground-nesting species. Funding problems are being encountered for post monitoring and data writing by Northern Prairie Wildlife Research Center (NPWRC).

Predators of concern to nesting waterfowl on LNWR consist mainly of skunks and canids. Skunks are monitored in Project 924. In 1987 four skunks were captured during 720 trap nights on research fields. Canid information was acquired under Project 901 which ended on LNWR in 1984. Data on canid distribution is extremely important in interpreting research results. To continue collecting these data for the on-going research project, Jerald R. Shoemaker (ADC) and Robert Murphy (LNWR) conducted the 1987 flight (with guidance from Alan Sargeant and Arnold Kruse). Results are presented on page 66.



Photo #1. We become one of them!

Marty Folk, supervisor of the 1987 drag crew on Project 924.02, not only did a fine job with the project, but also spent considerable time photographing waterfowl.

F-70 July 87 KS

It is very helpful to have research assisting management to help solve the many complicated riddles of wildlife management.

### b. Raptor and Corvid Study

A fifth field season was completed by Robert Murphy on the study "Nesting biology of raptors and corvids on Lostwood NWR, North Dakota." The objectives of Murphy's study are to obtain baseline information on composition, nesting density and success, nest area reoccupancy, breeding chronology, productivity, food habits, and nest habitat, and to evaluate and improve, if necessary, a method for monitoring long-term trends of this segment of LNWR's breeding avifauna. Few data are available on nesting raptors and corvids in northwestern North Dakota. Trends in diversity, numbers, and productivity of breeding raptors on LNWR should reflect impacts on prey density and availability from prescribed burning or other habitat alterations including outside

influences (e.g., surrounding oil development). Also, an understanding of the predator community aids in understanding waterfowl production trends.

Woody habitat > 3 m high was systematically ground-searched for nests during late May-early June. During 1985-87, stick nests from previous nesting seasons were checked during early April for occupancy by great horned owls; this search was supplemented by a census (March) of hooting male horned owls. Nests of ground-nesting raptors were located opportunistically. Care was taken to minimize disturbance to breeding raptors, following recommendations in the literature.

Occupied nest areas of all raptors were revisited (after hatching presumably occurred) to determine success and productivity. Nests with at least one nestling of bandable age (> three weeks old) were considered successful. Fresh prey items were identified and left in nests; other prey remains and contents of regurgitated pellets that were collected were identified later. Nearly all raptor (and, in 1986, all crow) young were banded. Most magpie nests were not revisited.

### Summary of Results

Great-horned owls (GHO) productivity continued to exhibit tremendous annual variation (Table 4). Nesting effort by GHO continues to appear to be related to late winter vole availability.

Numbers of nesting red-tailed and Swainson's hawks appeared to decline slightly in 1987; field observations suggested this was related to an increase in numbers of nesting GHOs. Redtail success and productivity on LNWR was not monitored in 1987.

Ferruginous hawks were observed occasionally but again did not nest on the refuge in 1987. However, nests 0.5 km west of the south part of the refuge, and 2.0 km northwest of Elbow Lake, fledged young. The nest area southwest of Elbow Lake was not occupied in 1987.

Two Cooper's hawk nest areas again fledged young in 1987. The nest west of Lower Lostwood Lake was 1.5 km north of the 1986 site, and was occupied by different adults. An adult Cooper's hawk also was observed several times east of headquarters, in mid-summer, although no nest was found in the area.

Short-eared owls were observed occasionally in the spring but, as in previous years, were not recorded as a breeding species on the refuge. More northern harriers and their nests were found, reflecting moderate vole abundance (see small mammal data, pages 66-69), and two long-eared owl nests occupied; both fledged young.



Photo #2: A long-eared owl broods its downy young in a stick nest constructed by crows in 1984. The nest fledged four owlets in 1987.

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Only four crow and eleven magpie nests were found in 1987. The apparent declining status of breeding crows on LNWR (and elsewhere in the prairie pothole region), remains a mystery, and needs to be investigated.

Preliminary field aspects of the study entitled "Food habits of great-horned owls and Swainson's hawks in waterfowl habitats of northwestern North Dakota," by R. Murphy (under NPWRC) were completed in 1987, and data are being analyzed. The work mainly is on private lands west of LNWR.

Table 4. Success and productivity of tree-nesting raptors, LNWR, 1983-87.

	Number of nests occupied (successful)							Productivity per occupied nest				
Species	1983	1984	1985	1986	1987	1983	1984	1985	1986	1987		
Red-tailed hawk	22(14)	22(8)	26(22)	29(23)	23(-)	1.1	0.7	1.2	1.2	-		
Swainson's hawk	5(1)	7(5)	4(2)	5(4)	2(2)	0.2	1.4	1.5	1.6	2.0		
Cooper's hawk	0a	i(1)	1(1)	2(2)	2(2)	0	(4)	(5)	4.0	4.0		
Great horned owl	>3(0)b	>3(3)b	14(14)	13(4)	17(13)	0	<0.3	2.0	0.5	1.5		
Long-eared owl	1(0)	3(2)	0	3(1)	2(2)	0	>2.0		1.0	3.5		

<sup>&</sup>lt;sup>a</sup>Cooper's hawk nest area defended by a single adult in 1983.

## c. Density of True Grassland Passerines on Prescribed Burned Areas

Mike Green, a PhD student from the University of North Carolina is studying the effects of wind on song and singing behavior of grassland birds at LNWR. Mike used three prescribed burn areas for his study. These areas (and years they were burned) are :Thompson Lake Burn (1980, 1982, and 1985); Iverson Lake Burn (1979, 1981, and 1983); and Teal Slough Burn (1981 and 1983). Most of Mike's work was done on the Thompson Lake Burn area.

Mike censused a portion of the refuge for densities of selected species, a project beyond the scope of his study, because we showed an interest in knowing the current densities. A brief summary of his census follows.

#### Introduction

Nine species of landbirds (Table 5) were systematically censused from 0600 to 110 hours on six days between 15 May and 10 July, 1987.

<sup>&</sup>lt;sup>b</sup>During 1983-84, only one nest search was conducted (late May) that did not account for horned owl nest areas that were abandoned earlier. Thus, a minimum number of occupied nests is reported here.

<sup>&</sup>lt;sup>C</sup>1984 horned owl productivity is based on a conservative estimate of 10 occupied nests.

Table 5. Censused grassland species on three prescribed burned areas on Lostwood NWR, 1987.

Species	Scientific Name	Abbrevation
upland sandpiper	Bartramia longicauda	UPSA
horned lark	Eremophila alpestris	HOLA
Sprague's pipit	Anthus spragueli	SPPI
vesper sparrow	Pooecetes gramineus	VESP
savannah sparrow	Passerculus sandwichensis	SASP
Baird's sparrow	Ammodramus bairdii	BASP
grasshopper sparrow	A. <u>savannarum</u>	GRSP
LeConte's sparrow	A. <u>lecontell</u>	LESP
western meadowlark	Sturnella neglecta	WEME

### Results/Discussion

The breeding pair densities of the nine species are reported in Table 6. I assumed that each singing male I heard while censusing represented one nesting pair. Thus, densities are reported as pairs per area  $(km^2)$ .

Table 6. Densities of breeding pairs of nine grassland species on three prescribed burn areas, LNWR, 1987.

Species							,		
Densities	BASP	GRSP	SASP	WEME	VESP	HOLA	UPSA	LESP	SPPI
# singing males	18	13	12	9	7	6	4	3	11
area censused (k	0.85 m <sup>2</sup> )	0.85	0.85	0.85	0.85	0.85	0.85	0.85	6.5
Pairs/km <sup>2</sup>	21	15	14	11	8	7	5	4	2

Baird's, grasshopper, and savannah sparrows are the most numerous species of the nine censused, and Sprague's pipit and LeConte's sparrow the least numerous. However, the distributions of several of these species were not uniform. Aspects of topography and vegetation most certainly contributed to the patterns of dispersion of several of these species. For example, LeConte's sparrows were confined to mesic depressions with relatively tall vegetation. Savannah sparrows seemed to have smaller territories than Baird's or grasshopper sparrows, and were clustered in the low-lying regions in the western half of the census area. Baird's and grasshopper sparrows were more widespread throughout the census area, as were western meadowlarks, vesper sparrows, and upland sandpipers. Sprague's pipits, and for the most part, horned larks held territories on hilltops and slopes. Horned larks also held territories on flat areas where the vegetation was very short, or non-existent (roads). The density estimates probably reflect, to some extent, habitat availability for the different species, e.g., the number of suitable hilltops (for Sprague's pipits) or moist depressions with certain vegetative characteristics (LeConte's sparrows). Some species seem more widely dispersed and may have less-restrictive habitat requirements.

The species chosen for inclusion in this report were species for which I had the most data - marbled godwit, sharp-tailed grouse, bobolink, and brown-headed cowbird all are common grassland breeding species at Lostwood, but I did not feel confident in my population estimates for these species.

There is one other prairie species I found nesting in the census area which has not nested on the refuge since probably about the 1960s: chestnut-collared longspur. Two males held territories on the west-facing slopes in the eastern portion of the small census area. I found one nest with four eggs in one of those territories on 15 May. I could not locate it a week later and presumed it abandoned or destroyed. The other male was particularly agitated when I approached a certain portion of his territory; I assumed there was a nest in the vicinity. I regularly saw female longspurs here, and occasionally heard them flying over other areas near Iverson Slough and Iverson Lake. The two males continued to display throughout the spring and early summer. One of these males, or possibly a third male, displayed for about two weeks in late June in the western portion of the small census area.



Photo #3: Chestnut-collared longspurs have not been known to nest on Lostwood for many years. Mike Green found two territorial males on Thompson Lake Burn; one pair had a nest that was unsuccessful, and the other territorial pair were thought to also have a nest but it was never found.

A-d-48

MG June 1987

# E. ADMINISTRATION

# 1. Personnel

# Des Lacs NWR Complex Staff

1.	Delano A. Pierce, Project Leader	GS-12	PFT
2.	Theodore W. Gutzke, Asst. Project Leader	GS-11	PFT
3.	Muriel M. Hansen, Refuge Asst.	GS-6	PFT
4.	Doris E. Huwe, Clerk-Typist	GS-4	PFT

# Lostwood NWR Staff

1. Karen A. Smith, Refuge Manager	GS-9	PFT
2. John Stewart, Maintenance Worker	WG-8	PFT
3. Todd Mills, Biological Technician	GS-4	
4. Robert Murphy, Volunteer/Research		
5. Joy Albertson, Volunteer/Intern		
6. Michele Funk, Volunteer/Intern		
<ol><li>William Veihl, Volunteer/Intern</li></ol>		

8. Tammy Myre, YCC

9. Mike Green, Volunteer/Research



8 5 7 1 3 2

## a. Personnel Action, Permanent Employees, Des Lacs Complex

Tim Kessler transferred from the Des Lacs Refuge in Feburary to fill the GS-9/11 Refuge Manager position at the Crosby Wetland Management District.

Bill West transferred from the J. Clark Salyer Refuge in March to fill the GS-9 Refuge Manager position at the Des Lacs Refuge.

Frank Kartch was promoted to GS-11 Refuge Manager (Realty) in November. This is a temporary, NTE one-year promotion. Frank will be doing 50% acquisition work with the Branch of Reality and 50% refuge manager work on the Lostwood WMD. So that management on the District does not fall behind, Regional Office has told us a permanent full time biological technician will be hired.

Tim Kessler was promoted to GS-11 Refuge Manager at the Crosby WMD in November.

Dave Gillund's TAPER WG-3 Laborer appointment was converted to a career appointment in October.

Table 7. Staffing-Des Lacs Complex

	Des Lacs Refuge			Lostwood Refuge			Lostwood WMD			Crosby WMD		H	H.Q. Staff			Compl Tota			
	Pe	Perm. Temp.		Pe	erm.	Temp.	Perm.		Temp.	Per	Perm. Temp.		Pen	m	Temp.	Perm.		Temp.	FY FTE
Yr.	F.T	P.T		F.T	P.T		F.T	P.T		F.T	P.T		F.T	P.T		F.T	P.T		
87	3	0	1	2	0	1	2	0	1	2	0	0	3	1	0	12	1	2	14*
86	3	0	0	2	0	0	2	0	0	2	0	0	3	1	1	12	1	1	13.1
85	3	0	1	2	0	1	2	0	1	2	0	0	3	1	0	12	1	3	13.6
84	2	1 1	1	2	0	1	2	0	0	2	0	0	3	1	0	12	2	3	13.7
83	2	1	.1	2	0	1	2	0	0	2	0	1	3	1	0	12	2	4	12.5
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#### 2. Youth Programs

One YCC position is currently permitted for Lostwood. Tammy Myre, hired from 8 June - 30 September helped significantly in various work projects ranging from pulling weeds to nest dragging for ducks. The majority of all local YCC help is top quality working youth, and Tammy is one of the best. With a little extra money, this program really helps Lostwood. It also provides income for local youth, and in Tammy's case, allowed her to go to a local college.

### 4. Volunteer

Lostwood is very fortunate to have a volunteer biologist of Robert Murphy's quality (manager's biases aside!). He provides constant ideas, analyzes data, and does volunteer field work on weekends and evenings, even though during the normal field season he completes a regular work week for NPWRC. If every refuge had this type of quality biologist, a manager's decision would be based on facts instead of guess work (paper).

Three other volunteers worked on Lostwood, Joy Albertson (25 May - 28 Aug), Bill Veihl (19 May - 7 Aug), and Michele Funk (18 May - Aug). Joy (student of North Dakota State University), highly qualified for her job, ran the drift fences and snap trapping, identified and museum cataloged all specimens, and expertly prepared many studied skins. Her talents needed to be recognized as a professional employee. Bill (student of Southern Illinois Unversity) completed monitoring of piping plover nesting densities and success. Without his monitoring, detailed accurate Information would not have been attained. Michele (student of University of Wisconsin-Stevens Point), worked with Robert Murphy, assisting him on various raptor studies. Without her help, Bob would not have gotten the useful, abundant data that he obtained.

There are three major problems hiring young volunteer help: 1), the busy field season is in full swing by the first of May, but volunteer help is not usually available until mid to late May. Once they do arrive, they first have to be trained and become familiar with the area. This can easily lead into mid-June. 2), they are usually sophmores and juniors, very inexperienced (this is why they took the volunteer position) which means more time is required for training. About the time accuracy and efficiency bloom, they are done with their "course work," and leave to go back to school. 3), it is a disgrace to the profession not to pay for biological help.

### 5. Funding

Table 8. Operational Funding Des Lacs Complex

FY	Base	Misc Fund	Re- Source Prob	Small ARMM's	Large ARMM's	Expense: for Sales	GTRS	YCC	Total
87	399.0	6.8	40	79.0	20	12	5.5	4.5	566.8
86	405.0	-	0	55.1	60	13	6.6	11.4	551.1
85	462.5	-	100	46.0	10	13	8.0	11.2	650.7
84	459.0	-	0	64.0	0	10	8.6	10.0	551.6
83	444.0	22.0	0	-	0	10	16.0	4.5	496.5

### 6. Safety

No lost time accidents occurred on the Des Lacs Complex in 1987 although one minor injury was noted. Dave Gins required minor first aid, during a prescribed burn some dust was blown into his eye. Water and eye wash were used to cleanse his eye and Dave continued work.

All fire extinguishers were checked, recharged, and replaced where necessary.

Gins, Stewart, and Vaage completed course work and were certified as Commercial Pesticide applicators.

The entire staff completed an eight hour Defensive Driving Course.

Gutzke, Pierce, and Vaage completed a CPR refresher course in the spring.

Jerry Felch is a Certified Heavy Equipment Instructor and he certified the Complex maintenance staff on heavy equipment during the year.

#### 7. Technical Assistance

Nancy Sather, Research Assistant, The Nature Conservancy, Midwest Regional Office, Minneapolis, Minnesota, inquired about controlling certain exotic plants without chemical controls. She inquired in her February 2, 1987 letter about the following species: musk thistle (Carduus nutans), Canada thistle (Cirsium arvense), leafy spurge (Euphorbia esula), wormwood (Artemisia absinthium), smoothe brome (Bromus inermis), reed canary grass (Phalaris arundinacea), Canada bluegrass (Poa compressa), Kentucky bluegrass (P. pratensis), and

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quaking aspen (<u>Populus tremuloides</u>). Our response to her is shown in Appendix 1. She returned a letter on April 22, 1987, regarding two "Element Stewartship Abstract" (described in Appendix 2), one on Kentucky bluegrass and the other on smooth brome, both becoming available in the near future, and would send me a copy. Robin Ross, Region Information Manager, The Nature Conservancy at the same office as Ms. Sather, send a copy of an Abstract on leafy spurge control. If anyone desires a copy, either contact Lostwood, or inquire through the information in Appendix 2.

Herb Troester, Fire Coordinator, Region 1, USFWS, inquired about slides of prescribed burns. Many were sent to him for review and duplication of the desired.

Personnel from Red Rocks NWR inquired about different biological monitoring programs for ecosystem management. Appropriate suggestions were provided through telephone contacts and correspondences.

Lewis and Clark State Park inquired in early April about prescribed burning, and asked to borrow drip torches. They never did come to get the drip torches, so it is unknown whether they actually did any prescribed burning or not.

USDA pesticide inspector, Bank Seeber, visited Lostwood on August 17 for an inspection and tour of our spurge areas. He attended the annual meeting of the Soil Conservation Society of America during the winter of 1986-87 where a pesentation was given on prescribed burning on native grassland. Within that presentation was a brief explanation of spurge control using fire and chemicals. Several spurge locations were visited. He was impressed enough to want several farmer/ranchers from his Turtle Mountain area to see the results. He called in early 1988, and the manager will give a presentation in his area sometime in March.

The manager was honored by visits by from several North Dakota FWS refuge managers who wanted tours of LNWRs grassland management program. In September, one crew came from Devils Lake WMD: Mike McEnroe, Roger Hollevoet, Doug Leschisin, and Rick Schnaderbeck; and in October, Sally Sovey from Audubon NWR.

The Prairie Committee from the North Dakota Chapter of The Wildlife Society, and Acid Rain Committee from The Wildlife Society have asked the manager if she would serve on these committees. She accepted.

### 8. Other

a. Meetings:

Karen attended the North Dakota Chapter of The Wildlife Society meeting in February.

Karen attended the Raptor Research Conference in Boise, Idaho in October.

Karen and Robert Murphy attended the Stanley Wildlife Club meeting in February.

Robert attended the Bowbells Ducks Unlimited banquet, and brought one of Karen's donated prints for auction.

Karen attended the Project Leaders meeting August 24-28.

### b. Training:

John Stewart completed pesticide renewal training on Jan. 20. John completed a two day course in February on maintenance of automotive electronic ignitions.

John completed his heavy equipment operators certification.

Karen attended the Advanced Session of the Refuge Academy for three weeks in March.

Karen completed the required 40-hr course work for Law Enforcement refresher in March, and qualified again on Sept. 22.

Karen attended Holistic management training from Sept. 30 to Oct.

2.

Joy Alberston, William Veihl, Todd Mills, and Michele Funk completed fire training June 16-17.

### F. Habitat Management

## 1. General

The white-berried juneberry (<u>Almelanchier alnifolia</u>), reported in 1985 and 1986 narratives, produced berries in 1985 (how we discovered it), but did not in 1986, the year we wanted to collect specimens. In 1987, it produced berries. Specimens with mature fruit were collected and pressed, and bushes were marked for collecting flowering stems this spring. Several berries were harvested; some were eaten and taste identical to the normal juneberry, but most were kept for seeds. Attempts will be made to sprout the seeds this spring.



Photo #4. One of the best juneberry crops in history occurred this year. Bushes drooped half way to the ground with the heavy, large-sized berries. Many were harvested by various species!

В-с-б.

July 87, KS.

About 4160 acres were vegetatively mapped in 1987; this brings the total to 6624 acres or about 25% of the refuge. The refuge's vegetative mapping is used by the National Wetland Inventory team for ground truthing of computer print-out maps and habitat files for Lostwood.

Soils were mapped on most of the refuge by Soil Conservation Service. Soil mapping on the entire refuge will probably be completed in 1988.

Refuge Objectives for Lostwood were set in a 1971 "Master Plan" written at the Minneapolis Regional Office when ND was under that regions jurisdiction. These are:

### WILDLIFE

Provide for maximum natural production of ducks and Canada geese within biological and economic limitations.

Provide protection and conditions that will perpetuate all native animals species on the refuge.

Demonstrate management practices that people can use to enhance wildlife values on private lands.

Reintroduce select species of native wildlife.

#### WILDLANDS

Recreate and preserve native prairie conditions consistent with total refuge management needs.

Consideration of a portion of the refuge for inclusion in the National Wilderness Preservation System.

#### PUBLIC USE

Provide a visitor program that stresses increased understanding, appreciateion and enjoyment of wildlife and the environment.

Provide economic benefits that are consistent with primary management requirements.

Presented herein is a description of an evolvement that is striving to maintain and improve the unique natural resources of Lostwood using refuge objectives, historical records, ideas, research, and field monitoring as guides.

#### Perspective

Field notes from Remington Kellogg and Vernon Bailey are found in the Smithsonian Archives, "Guide to the Field Reports of the United States Fish and Wildlife Service," by William E. Cox, and provide the first detailed resource inventory of the Lostwood area. They described this area, in 1913-15, as "...high prairie country... numerous lakes and marshes...The only timber...was formerly on the southeast corner of Lostwood Lake but this was cut by homesteaders, and... nothing is left but small oak and poplar brush, with a clump of willows here and there." Some species they described as "all over the prairie" were chestnut-collared longspurs, lark buntings, bobolinks, horned larks, Sprague's pipit, and vesper, Baird's, and grasshopper sparrows. Kellogg wrote "Homesteaders here tell me that the ducks make so much noise at night that they had to get up and shoot to scare them away so that they could sleep." He goes on describing mallards as the most abundant of all ducks, pintalls second, blue-winged teal third, shoveler fourth, with others common - wigeon, gadwall, lesser scaup, and redhead. Swalnson's hawks he describes as common with no mention of red-tailed hawks and great-horned owls were scarce. The ecosystem was abundant with grassland bird species.

Common mammals Kellogg and Bailey wrote about were Richardson's and thirteen-lined ground squirrels, along with Jackrabbits, prairie and meadow voles, and deer mice; again all grassland species. Franklin's grounds quirrels never were seen by local specialists, and Kellogg recorded this species as "evidently not common." Red fox were described as common before coyotes increased, but rare thereafter. A few skunk and raccoon were found along Mouse (Souris) River, and badger were described as "a few over all the prairie country."

### Today's Picture

It's different. There is an increasing woody plant community component (aspen groves and brush) and a declining grass-forb component in the prairie community. Bird life is changing. Examples: ferruginous hawks are gone and there are few Swainson's but numerous red-tails and horn owls (which are more important predators of breeding ducks); clay-coloreds are the most abundant sparrow, and there are relatively few true grassland sparrows. Ducks remain abundant, although there are fewer than in the 1910s, a problem not just restricted to Lostwood. Mallard and blue-winged teal remain the most abundant species, but pintails are one of the least common species.

Mammal composition has changed too. Franklin's ground squirrel, a species attracted to western snowberry, are fairly abundant, but there are fewer thirteen-lined and almost no Richardson's ground squirrels (Franklin's are an important predator of duck eggs, but neither of the other two are). Voles remain abundant in mesic grassy areas (important food item for predators), but most of these sites now are brush-dominated and harbor few voles. Although unknown to be affected by the plant community, red fox increased in the 1930s to 40s, but decreased in the 1970s when coyote numbers increased. (In northern latitudes, coyotes help maintain high duck hatching success by actively excluding red fox out of their territories). Coincidently, as coyotes increased, skunks and raccoons decreased, and have remained in low numbers in most years.

Lostwood was established as a "...refuge and breeding ground for migratory birds and other wildlife..." and effectively can be managed as a "whole ecosystem." What is done to one part of the system, affects all other parts. There are, of course, certain out side influences, e.g. negative impacts on air and water quality, that may affect Lostwood, but inclusive components can and should be managed as a whole.

The Lostwood crew is striving to manage the area as a whole ecosystem, a healthier grassland community, similar to its presettlement condition. Vegetation management is the key. By managing native vegetation, native wildlife species will benefit. For example, on Lostwood, Franklin's ground squirrel are most abundant in snowberry. Reducing snowberry will potentially decrease Franklin's by increasing their vulnerability to predators. Increasing grasses will enhance numbers of voles, a preferred prey item for many predators. Decreasing the numbers of aspen groves should decrease the number of breeding pairs of great-horned owls and red-tailed hawks, and the hunting perches on which they depend.

This in turn should increase Swainson's because the foraging habitat is changed (Swainson's aerial hunt and cannot easily penetrate the woody species for prey), which is also more attractive to Richardson and thirteen-lined ground squirrels, their main food items. Decreasing aspen groves also will restore many wetlands; > 300 wetlands are completely covered with aspen trees, virtually eliminating them. Managing vegetation towards conditions similar to the past will directly affect true grassland bird species, such as Baird's sparrows, which continue to lose habitat on private lands. All of these alterations should not change the current high density of breeding ducks, current research is beginning to suggests this; it worked in the 1900s and should work again.

If management schemes that include non-treatment (idle) were selected, current vegetation trends would continue towards woodland, as Lostwood, with some areas changes from mixed grass prairie to aspen parkland. Idle stands of western snowberry would succumb to smooth brome. Aspen trees and brome would be the dominant features of Lostwoods 26,747 acres. When plant diversity is lost, so also is wildlife diversity and abundance. Would this be in the best interest of migratory birds, and would this be the best way for professional biologists to manage a natural resource as rich as Lostwood for future generations?



Photo #5. Yellow umbrellaplant (<u>Eriogonam flavum</u>) is found on dry gravel hilltops. The soil diversity of Lostwood promotes a plant regime that is extremely unique, and should not be lost, not only for its value as a base for wildlife diversity and abundance, but also for future human generations.

B-a-73 KS July 87

### 2. Wetlands

### a. Runoff and Water Levels

Spring runoff filled some wetlands in the upper watersheds. The basins of remaining wetlands were less than half filled. This is the first spring in at least 10 years that a spring storm and freezing temperatures in late April or May did not occur and stop duck breeding pair activities on wetlands. Wetland activity began about 2 weeks ahead of normal, including duck arrival and nesting. Wetland water levels dropped rapidly after snowmelt in late March-early April because there was little moisture; the average annual precipitation for April-June is 5.12 and in 1987 there was only 2.79 inches. Early nesting ducks took advantage of the early spring, and a higher number made it than would have in normal spring temperatures. July had slightly above normal

rainfall but not enough to restore water levels to save late-hatched duck broods. August through September experienced less than half the normal precipitation, leaving most wetlands dry. Conditions appear nearly identical to the "dirty 30s."



Photo #6. Wetlands that have not been dry since the 1930s are dry today. This 25.2-acre class IV-B wetland had water levels in 1979 up to the brush line, and was completely open water. The wetland in the background is part of the whole wetland in high water years. This wetland should gradually fill with emergents like the wetland did in Photo #7.



Photo #7. In 1979, this basin was all open water. It was dry during fall months for about the last 3 years. Emergents have enclosed the entire basin except for a small opening in the middle. As high water levels return, the wetland will open up once again, providing excellent overwater nesting habitat for canvasbacks and redheads.

G-b-141

KS 7 July 1987



Photo #8. Historically, prairie fires readily burned in dry years, removing litter from upland areas, and inhancing runoff in subsequent seasons. In this way, prairie fires, particularly in dry years, may have contributed to more runoff into wetlands. Teal Slough, shown here, was part of a prescribed burn on 6 Aug 1987. The fire removed the upland litter, and swept across the wetland's moist soils, burning off many year's growth of emergent plant cover, perhaps increasing the wetland's life span.

Aug 1987 KS

Water levels in wetlands are monitored in two ways: recording wetlands during duck pair counts in mid-May (Table 9), and by reading staff gauges on 13 wetlands from spring runoff to freeze-up (Table 10).

Table 9. Wetland water conditions on 17 quarters during mid-May, LNWR, 1987<sup>a</sup>.

		198	7
Wetland Class	No. of Basins	% Basins With Water	Ave. % Water Per Basin b
I II III IV	105 82 180 45	01 17 69 91	05 22 43 50
V	3 2	100 100	85 88
Total	417		

<sup>&</sup>lt;sup>a</sup> Data collected during duck pair counts on same quarters as pair counts.

b Includes only basins with water.

Table 10. Water levels on 13 wetlands: percent change from 17 March reading, and number of dry basins at each reading, LNWR, 1987.

	Class (N=6		Class (N=4)	Class V (N=3)	
Date	% Change	# Dry	% Change	# Dry	% Change
14 Apr 11 May 15 Jun 17 Jul 02 Sep 16 Nov	0 -41 -85 -100 -100	0 0 4 6 6	0 -15 -55 -75 -84 -95	0 0 1 2 3	0 -10 -28 <sup>a</sup> -46 -58 -70

<sup>&</sup>lt;sup>a</sup> The gauge in a bay of Thompson Lake was dry by 15 June and throughout the rest of the summer. Percent change includes the dry bay, although the lake was not dry.

# b. Wetland Water Quality

Sulfur emissions from oil, gas and coal development in western North Dakota, eastern Montana, and southern Saskatchewan may negatively affect fresh water wetlands on LNWR. Air and water quality on LNWR needs to be monitored to determine if effects are occurring.  $SO_2$  and  $H_2S$  monitoring began in December 1985 (results of air monitoring are presented on pages 46-48). In 1985, water monitoring began on three freshwater wetlands (Class IIIA); pH and temperature was analyzed. (Fresh water wetlands are used for water monitoring because they have very little buffer to neutralize acid precipitation). In 1986 three freshwater wetlands, and 1987 six freshwater wetlands, were tested for pH, conductivity, dissolved oxygen, and alkalinity twice per month at the surface and every 15 cm to the bottom. Both years were dry, causing wetlands to prematurely go dry, reducing the quantity of data obtained. In 1987, common ion (Ca, Mg, Na, K, bicarbonate as CaCO3, carbonate as CaCO3, sulfate, and chloride), trace elements (As, Cd, Cr, Pb, Hg, Se, Z, Cu, Fe, and Mn), and nutrient (ammonia-nitrogen, nitrate-nitrogen, and . phosphorus as  $PO_4$ ) data were collected monthly on each wetland through a certified EPA lab. There is only one to two years of data available, so interpretation possibilities are minimal. After 1988, interpretation of data will become more realistic.

#### c. General

The 1987 spring was the first to pass without a snowstorm or prolonged freezing since 1978. This helped early nesting waterfowl species by keeping invertebrate availability maximized for pairing, nesting, and early brood rearing needs.

Dry conditions are conducive to filling old drainage ditches. Six ditches were filled, ranging in size from a beaver run in the Wilderness Area, to a ditch large enough to conceal a D-6 cat. One of the larger ditches, filled with a mechanical front end loader, is shown in Photo #9A after it was filled. Map 3 shows locations of ditches filled this year.



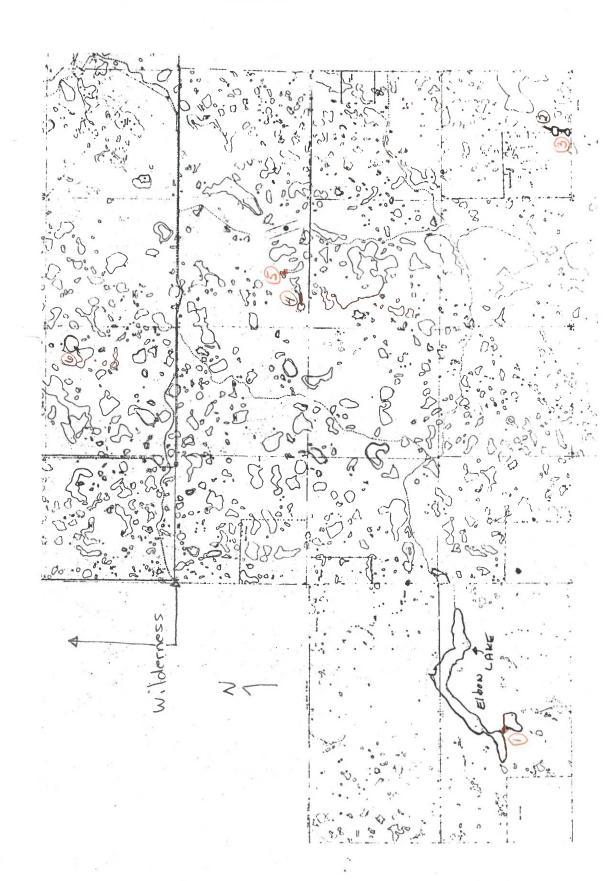
Photo #9A. One large ditch filled with a front end loader. The ditch drained the class III wetland (to the left, and only a third of it is visible in the photo) into Elbow Lake; it will likely become a class IV.

C-137 & 138

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KS

DEAINAGE DITCHES FILLED IN 1987



#### 3. Forests

When the Lostwood area was first homesteaded (1900), few trees were present because fire suppressed woody plants. Murphy calculated, for his raptor study, the quantity and acreage of trees on LNWR in 1985.

Table 11. The quantity and acreage of trees from early 1900s to present on LNWR, based on historical records (early 1900s), and aerial photographs (1938 and present).

	LNWR Aspen, Early 1900s	1938	Present
Total Acres	0	100	375
Total Clumps	-	275	>500
x Clump Size, Acres	-	0.4	0.8

Lostwood is becoming parkland with enlarging aspen groves and spreading western snowberry and brome. With the habitat change, comes changes in wildlife species. On pages 22-24 discusses changes in the raptor community and potential effects on waterfowl, and about other migratory species.

Summer prescribed burns are gradually affecting smaller aspen groves. Saplings and pole-size trees (4-6 inches dbh) cambium layer is killed by summer burns. The affected trees remain green throughout the rest of the summer, but by next spring, only a few leaves show in the tree top and they die by mid-summer. Few aspen sprouts are found around these burned trees. Experts suggest that the fire killed the cambium layer during the peak growing season, preventing the tree from restoring its root reserves. Consequently, little reserve remained for the following years' leaf growth, and the plant died. Historically, fires occurred most frequently in summer, perhaps at a time when fire effectively curbed woody growth.

#### 4. Cropland

Forty acres of a strip contour field and 13 acres of firebreaks (3 1/4 miles) were seeded beginning on 28 April. The catch was good, as rows of seedlings could be seen in May, but the long, hot dry spell throughout May and June may have killed the seedlings because few plants were observed by August. Annuals were mowed in late June instead of spraying with chemicals.

### Composition:

Firebreaks: blue grama (Bouteloua gracilis), sideoats grama (B. curtipendual, Killdeer), green needlegrass (Stipa viridula, Lodorm), western wheatgrass (Agropyron smithii, Rosana), little bluestem (Andropogon scoparius, Camper), big bluestem (A. gerardi, ND), and switchgrass (Panicum virgatum, NDG-965-98).

<u>Dry Strips:</u> blue grama, prairie sandreed (<u>Calamovilfa</u> <u>longifolia</u>, goshen), sideoats grama, rough fescue (<u>Festuca scabrella</u>), green needlegrass, and western wheatgrass.

<u>Middle Strips:</u> little bluestem, sideoats grama, western wheatgrass, green needlegrass, prairie sandreed, rough fescue, and big bluestem.

<u>Low Strips:</u> switchgrass, big bluestem, green needlegrass, and western wheatgrass.

Two decadent fields of brome and quack grass are being prepared for native grass seeding. These fields are Class VI lands and were evaluated by SCS for acceptable levels of soil losses during seed preparation. The acceptable level occurred with the following rotation: sprayed in spring, mechanically broke out in late summer and fall, fallowed the second year through early August, then compacted and seeded to a cover crop (oats), and natives either dormant-seeded or drilled into stubble the next spring. To prepare the fields for chemical treatment, the 40-acre field (SW1/4 NW1/4 Sec.4 T159N R91W) was prescribed burned in 1986, and the 10-acre field (SE1/4 NE1/4 Sec. 4 T159N R91W) was mowed in the fall of 1986. On 4 June 1987 Roundup was applied with ground booms, the areas were spiked 4-5 times beginning 11 August, and were disced beginning 21 October (to expose the roots to freezing before any growth could take place).

The resident blue grama lawn is beginning to look like a lawn. It is spreading nicely, filling in the bare spots on most of the lawn. Roundup was brushed onto scattered patches of Kentucky bluegrass and brome in May.

# Grassland

If you have not read the Habitat-General section found on pages 20-24. please read prior to this section. Current management techniques are formulated from the historical past, and are based on today's biological information. Techniques used to renovate, and eventually maintain the prairie as a grassland instead of a parkland are described in this section; parkland actually is the transitional area between the boreal forest and prairie.

Fire, in the history of grassland, was an essential component maintaining healthy native grasses and forbs and thus, their associated fauna. Fire also prevented woody plants from thriving. As fire was virtually eliminated from area grasslands with the advance of homesteads in the early 1900's, brush species, especially western snowberry have

become dominant, shading out native grasses and forbs. Aspen trees have grown and are spreading. Introduced grasses, especially quackgrass (Agropyron repens), smooth brome, crested wheatgrass (Agropyron cristatum), and Kentucky bluegrass (Poa pratensis) have invaded into native grassland because native grasses and forbs, unlike exotics, cannot compete in the litter that accumulates from lack of fire.

A prescribed burning program, referred to as renovation prescribed burning, has been used on LNWR since 1978. In general, each area receiving renovation will be prescribe-burned every other year either in mid-June or late July to early August for three burns. Timing of the burn is critical for the most efficient reduction of snowberry. Once renovation has been completed, grasses spread into brush stands. Then, maintenance prescribed burning, plus a possible spring or fall grazing every few years to discourage introduced grasses will be needed to prevent LNWR from returning to its present condition.

The ecosystem in the past also adapted with influence from grazing and browsing herds of ungulates. During the renovation period, some areas that are prescribe burned and have excessive amounts of introduced grasses, are treated with early spring grazing. Introduced grasses typically germinate earlier in the spring than do native cool season grasses. Cattle graze introduced species until the natives begin to grow (typically late May to early June). Cattle are removed as they begin to graze on native grasses. The management goal is to create conditions that permit the natives to easily compete with the earlier germinating, introduced grasses.

As Lostwood's prairie is returned to grassland, maintaining the ecosystem also may call for different types of livestock grazing systems, (e.g. short duration grazing), but treatments must be infrequent enough that good "tent" litter (litter not laying flat) is maintained for nesting cover.

Summaries of research and biological monitoring regarding fire and is found in Research and Investigation, Fire Management, and Wildlife sections of this narrative.

# 7. Grazing

Two pastures for grazing from 1-31 May at lac/AUM were offered to local livestock operators. The two areas selected are covered with exotic grasses. The early spring grazing is employed to put stress on the earlier germinating exotic grasses, and cattle are removed as native, cool season grasses begin to grow. Two operators applied for the one 50-acre pasture and none for the 115-acre. Several phone calls were made to local operators, but some already had plans for spring grazing, and others did not want to move 100 head of cattle for such a short perold of time. The news release used to advertise the pastures is shown in Appendix 3.

Polywire electric fence was used to close off the 50-acre pasture. The management flexibility that this type of fence provides increases the potential for site management with cattle.

#### 8. Haying

A "Drought Disaster" was declared by the State for Mountrail County. In accordance with "Agreement Number 11" between the Governor of North Dakota and the Regional Director, a list of lands available for haying was submitted. Lostwood offered 5 areas, totalling 208 acres of old fields that were mostly brome with lots of litter. One operator looked at the fields and decided the hay quality was too poor and declined, especially when he learned he had to pay for it.

# 9. Fire Management

# a. Refuge Prescribed Burning Goal

If you have not read Habitat-General, and Grassland sections found on pages 20-24 and 33-34, please read prior to this section. The goals of the refuge burning program are to reduce western snowberry, increase native grasses and forbs and acquire experience and knowledge on how to conduct safe and successful burns. This knowledge was used for prescribed burning the Wilderness Area and will be used for future burning on all portions of the refuge. A comprehensive prescribed burning program for the refuge will be developed when enough data becomes available.

The refuge has been involved in a prescribed burning program since 1978. There are three burn phases in this program. The first phase, called renovation burn, is designed to have maximum adverse affect upon snowberry. Most burn areas on the refuge are in this phase. This involves burning an area every other year until three burns are completed. The second phase, called renovation-maintenance burn, is designed to begin the third year after the last renovation burn. This is conducted during months that fires most frequently occurred historically, or if lots of exotic grasses are present, in early May burns. This phase involves two burns with two to four years of rest between each burn. The third phase, called maintenance burn, calls for burning in frequencies of years and during months that fires occurred historically. This last phase will be part of the refuge management for perpetuity.

People usually envision a grassland fire producing complete blackness. On LNWR, fire usually creates a mosaic pattern of burned and unburned areas. In addition, some areas burn one time but not the next, some burn every time, and some do not burn at all. This is due to many reasons e.g.:

rolling topography causing winds to fluctuate, wetlands causing the fire to create a "down burn" protected area,

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tree groves causing a micro-climatic change (higher relative humidity, lower temperatures and less wind) that prevents fire from entering, and

snowberry patches, that burn once but do not burn again because the lush green sprouts are unburnable for many years (unless grasses encroach).

The end result of these variables is an array of diverse habitats and habitat edges, conducive to wildlife diversity and abundance.

#### b. Research and Monitoring Results

In 1979, 94.6 acres of Teal Slough Burn (1220 acres) was searched (nest dragged) for waterfowl, grouse, and other large ground nesting avian species. On 11 June 1981 and 28 July 1983, the area was prescribe-burned. It was rested from 1983 through the nesting season of 1987. This same area was nest dragged in 1987; nest dragging was completed by Northern Prairie Wildlife Research Center in both years. (Photos #9 and 10 represents changes in vegetation appearance.) Table 12 presents this data and duck pair counts for both years. Apparent hatching success was about the same for both areas, 59.1% for 1979, and 62.5 for 1987 for all duck species (Mayfield was not calculated for 1979). However, there are problems in evaluating these data: 1) there are no control areas, 2) there is only one field, 3) 1979 was a very high water year, while 1987 was dry, nearly as dry as the "dirty 30s", 4) there were three drags in 1979 and four in 1987 (about 6-8% increase in number of nests may be expected), 5) the continental mallard population is down significantly from 1979 to 1987 which would presumably have a negative effect, 6) voles were significantly more abundant in 1979 than in 1987 (voles are a buffer species, and when readily available, positively affect waterfowl hatching success). However, it is safe to say that waterfowl are still attracted to, and nest in at least similar densities on prescribed burn areas after 2-3 years of rest, as on other (idle) areas. In addition, these prescribe-burned areas are more attractive to true grassland species such as Baird's sparrows (see pages 10-12).

Table 12. Duck pair counts, and nest drag results on Teal Slough Burn for 1979 and 1987 are presented here for simple comparison only! Please be cautious, presentation of these raw data - unanalyzed as such - is preliminary.

Number of	Duck Pa	irsa	Nest Draggi	ng - Nest	s/100 Acres
Parameters	1979	1987	Parameters	1979	1987
MAL BWT Total	2240 3240 10902	1363 1489 6332	MAL BWT Tot. Ducks	39.1 14.7 82.4	26.4 9.5 72.9
			Grouse Uplands <sup>b</sup> N. Harrier	1.0	13.7 3.1 1.0
			Tot. All	84.5	90.9

a Based on duck pair counts, completed on 17 quarters annually and projected for annual breeding pairs for the entire refuge.
b upland sandpipers



Photo #9. The appearance of vegetation on 4 June 1980, Teal Slough Burn, prior to any prescribed burning. This Photo Point, about 100 yards north of the area nest dragged in 1979 and 1987, is representative of the dragged area. KS



Photo #10. The appearance of vegetation on 18 June 1987, after two prescribed burns (11 June 1981 and 28 July 1983). This is the type of cover ducks, grouse, upland sandpipers and harriers were using for nesting in 1987. KS



Photo #11. A mallard pair on a wetland in the Teal Slough Burn area. Mallards are still attracted to nesting on Lostwood, even with shorter and less dense snowberry because there are good wetland complexes and a high hatching success. See above text for more information.

Avian census results on two burns are shown in Table 13. True grassland species are increasing on prescribed burned areas. A PhD canadidate, Mike Green, did detailed passerine censuses on Thompson Lake Burn area: consult pages 10-12 for results.

Table 13. Response of breeding birds on two burn areas, LNWR, 1979-87.

		True Grassl	and Species	Alls	Species
	Year Burned	# of Spp.	# of Indi- viduals <sup>C</sup>	# of Species	# of Indi- viduals <sup>C</sup>
Teal S	l. Burn			=	
1979 1980 1981 <sup>a</sup> 1982 1983 <sup>b</sup> 1984 1985 1986 1987 <sup>b</sup>	x x	7 7 6 7 7 8 11 10 8	25 37 26 39 30 24 50 73 58	24 23 31 37 35 32 40 32 34	180 179 292 202 203 143 190 226 192
N. Dea	d Dog Sl	. Burn			
1979 <sup>b</sup> 1980 1981 1982 <sup>b</sup> 1983 <sup>b</sup> 1984 1985 1986 <sup>b</sup> 1987	X X X	4 7 10 - 7 4 8 8 8	45 27 50 - 25 30 29 54 <sup>a</sup> 66	23 22 30 - 26 23 29 20 32	176 158 211 - 128 64 181 150 201

a Census was conducted before the burn.

Census was conducted after the burn.

There was only one observer in 1984-87 which may have affected the number of individuals observed; in previous years Robert and Ann Gammell, local birding experts, completed the census.



Photo #12. Baird's sparrows are increasing on prescribed burned areas. This species was "blue listed" in 1982 and is still listed because Breeding Bird Survey data show negative tendencies throughout most of its range. Cause of decline is unknown, but several authorities suggested habitat changes brought about by agriculture are the likely cause.

A-d-46 MG June 1987

Vegetation composition changes take longer to evaluate, some studies have identified a minimum of ten years is needed to begin to see vegetation trends. On Thompson Lake Burn, it is becoming evident that Kentucky bluegrass is far less dense, and is receiving competition from native grasses and forbs. Repetition burning (Thompson was burned in 1980, 1982 and 1985) exposed the soils to the sun, drying them out, putting bluegrass under stress which causes it to flower. These conditions are less conducive to dense, layers of exotic grass litter that suffocates native plants. An interesting news article in a local paper about Kentucky bluegrass brought out further information on how burning may help to reduce bluegrass.

"When seedheads are allowed to remain on a turf, they will ultimately weaken the turf. Seed formation of any plant will require carbohydrate energy, and turf is no exception. This carbohydrate utilization to form seeds will result in less tillering, weaker crowns and less rhizome formation, all of which translate into a thinner, weaker turf." The Burke County Tribune, July 8, 1987.

Vegetation height-density is measured through Robel readings. Three prescribed burn areas monitored are shown in Table 14.

Table 14. Average maximum height and Robel height-density (decimeters) on three burns in early spring prior to any green growth, LNWR, 1978-87.

	Year Burned	Max Height	Height- Density	Annual Precipitation
Hdqter Bu	rn			
1978 1979 1980 1981 1982 1983 1984 1985 1986	X X X	5.12 4.22 6.53 3.75 4.60 3.46 3.50 3.30 3.78	0.51 0.44 0.60 0.27 0.82 0.41 0.35 0.55	14.96 8.72 15.59 15.34 19.56 12.19 19.48 18.40 18.04 12.16
Teal S1.  1979 1980 1981 1982 1983 1984 1985 1986	Burn X X	5.26 - 3.82 5.40 3.10 4.54 4.80 4.04	2.03 - 0.25 1.00 0.04 0.36 1.18 1.11	8.72 15.59 15.34 19.56 12.19 19.48 18.40 18.04 12.16
N. Dead D 1978 1979 1980 1981 1982 1983 1984 1985 1986	og Burn  X  X <sup>a</sup> X	6.02 - 4.72 4.82 3.50 3.52 3.81 2.98	1.11 - 0.57 1.00 0.56 0.38 0.85 0.45	14.96 8.72 15.59 15.34 19.56 12.19 19.48 18.40 18.04 12.16

a Less than 20% of the area burned.

A concern by some is the loss of snowberry, but as is being documented, mallards and other nesting ducks will continue to nest here in densities similar to the past. Regardless to this, snowberry will remain on Lostwood, but in a younger growth form that produces abundant berries, and in smaller patches. Photos # 13 and 14 shows that snowberry will remain a part of Lostwood.



Photo #13. Iverson Lake Burn on 4 June 1980, one year after its first burn, showing snowberry after being burned once.



Photo #14. Same area on 18 June 1987, after 4 burns, showing the remaining snowberry in smaller patches and vigorously growing.

Figures 1, 2, and 3, presents changes in brush (western snowberry, wild rose (Rosa woodsii), and silverberry (Elaeagnus commutata)) on the Iverson Slough Burn. All readings were completed before to June burns. No average brush height was recorded from 1978 to 1982. In 1983-87 the average brush height was 7.6, 8.1, 8.4, 5.7, and 6.6 inches respectively. The average height prior to the 1978 burn was probably about 20 inches.

```
50
          ***
          ***
          ***
a 38
n
          ***
0 32
                                ***
          ***
y 26
  20
           78
                79
                      80
                           81
                                 82
                                      83
                                            84
                                                 85
                                                       86
                                                            87
           b
                       b
                                  b
                                                  C
```

Fig. 1: Brush canopy cover on Iverson Slough Burn, 1978-87. The "b" shows what year mid-June burns occurred; "c" shows year of a July burn.

		b		b		b			С			
		78	79	80	81	82	83	84	85	86	87	
	10	***		***	***	***	***	***	***	***	***	
n	•	***		***	***	***		***	***			
i	14	***		***								
		***		***								
t	18	***		***								
h		***		***								
g	22	***										
i		***										
е	26	***										
H		***										
	30											

Fig. 2: Maximum brush height on Iverson Slough Burn, 1978-86. The "b" shows what year mid-June burns occurred: "c" shows year of a July burn.

	22									***		
	21									***		
	20									***		
G	19				***					***		
r	18				***		***			***		
_											MMM	
е	17				***		***			***	***	
е	16		***		***		***	***		***	***	
n	15		***		***	***	***	***		***	***	
	14		***		***	***	***	***	***	***	***	
S	13		***	***	***	***	***	***	***	***	***	
t	12		***	***	***	***	***	***	***	***	***	
е	11	***	***	***	***	***	***	***	***	***	***	
	10	***	***	***	***	***	***	***	***	***	***	
S	9	***	***	***	***	***	***	***	***	***	***	
	8	***	***	***	***	***	***	***	***	***	***	
		70	70		04		00	0.4	٥٢	0/		
		78	79	80	81	82	83	84	85	86	87	
		b		b		b			C			

Fig. 3: Number of green brush stems on Iverson Slough Burn, 1978-86. The "b" shows what year mid-June burns occurred; "c" shows year of a July burn.

The percent canopy cover in 1987 is minimal (Fig. 1) from pre-treatment. The maximum (Fig. 2) and average height is also minimal. However, there has been a dramatic increase in the number of green stems. Figure 3 shows an increase in the number of green stems from 1978 to 1982, then a decrease from 1983-85, but the number of stems is still above pre-burn levels. This increase in number of green stems following a burn followed by a decrease in the second year, also has been observed in research at Kansas State University. At the 1984 Prairie Conference in Fargo, one researcher described a selection process that may occur whereby only the fittest stems survive one year after the burn. After the 1985 burn, many tiny green snowberry shoots were observed in 1986. If the pattern continues, 1987 should show a decrease in number of green stems again. Yes, the decrease is there. After four burns, it appears some brush areas will be present in smaller patches with less height and canopy coverage, but filled in with grasses and forbs. Looking at the Robel readings (Table 10), the Headquarter Burn with four burns and rested in 1986 appears to have slightly higher height-density reading in 1987 than it had before any burns. This is probably do to the sparce understory of old growth snowberry prior to leafing, allowing the Robel pole to be visible at lower readings than the average height of snowberry. As the grass fills in, the pole is less visible, thus higher readings. Time will tell more.

### c. 1987 Burns

There were six prescribed burns planned for 1987 totalling 5409 acres. Three of the six were completed, totalling 2689 acres. Burns not completed and why: 86' Reseeded Natives Burn (100 acres), natives grew too rapid; East Lower Lostwood Lake Burn (1634 acres), unsuitable weather (wrong wind direction); and South Elbow Lake Burn (986 acres), unsuitable weather (too dry and wrong wind direction).

Piping Plover Burn (212 acres), burned on 24 April received its first burn. This area is a strip along Upper Lostwood Lake where piping plovers attempt nesting. Excess old growth accumulation along the shoreline was potentially a deterrent to pipers, so it was hoped cleaning the shoreline off would make the area more attractive to the plovers. It appeared to help, see page 54.

Tinjum Burn (983 acres) received its first renovation burn on 11 June.

Teal Slough-Iverson Lake Burn (1494 acres) was burned on 6 August. This formly was two separate burn areas, but was combined when the firebreak between the two burn areas was seeded to natives in 1986. This is Iverson Lake Burn's fourth burn or the first renovation-maintenance burn. It is Teal Slough Burn's third renovation burn.

The fire crew is using more wet-chemical lines for firebreaks and phasing out the "plowed" firebreaks. The chemical being used is called "Phos-chek" from Monsanto Company. It is ammonium phosphate, a plant fertilizer. It does not have the same safe guard as exposed soils, but if the fireline is moved prior to applying Phos-chek, an exceptable retaining line is created that last for six to eight hours.

# 10. Pest Control

#### a. Leafy Spurge

An intensive effort was begun in 1979 to control and possibly eradicate leafy spurge (Euphorbia esula) from the refuge by spraying Picloram (Tordon) in June-July and September-October of each year. In 1987, Picloram again was sprayed (or Tordon pellets applied) during the two periods on all known spurge locations. Spurge areas burned 1-3 times and sprayed for several (4-6) years have only a few detectable plants left. In 1987, more time was spent looking for spurge plants at former sites than was spent applying chemical. LNWR started out with about 16 acres of spurge on the entire refuge. There are now only about 8 acres of spurge left. Some entire spurge areas are still sprayed just in case one small plant grows and produce seeds undetected. In the 1987 fall spraying, only plants observed were chemically treated. Letters informing Burke and Mountrail County board members that spurge was treated twice on Lostwood in 1987 were sent on 23 October.

Refuges will not be able to use Tordon much longer. Spurge is being controlled at Lostwood, and Tordon is the only known successful chemical for leafy spurge. It is hoped that Lostwood will be able to continue to use it until another effective chemical is found, or biological controls are developed.

In early January 1987, County Weed Control Officers from Ward and Mountrail counties, phoned and wrote to Lostwood concerning the possibility of discontinuing use of Tordon on Service lands. I had not heard this before. After several discussions, the Officers agreed to wait and see if "no control" was to be the new policy on FWS lands before they began writing letters. They identified a "new" chemical, Krenite "S," that was being studied for use on spurge. It is safer than Tordon; LD $_{50}$ s (mg/kg) of some commonly used chemicals are: Banvel 2900, Roundup 4320, Tordon 8200, and Krenite S 24,000 (the larger the number, the safer the product). Krenite S's half life is 7-10 days - it breaks down rapidly in soil and water - and is labeled for use adjacent to potable watershed areas. It has been EPA approved for leafy spurge. This may be an alternative until biological controls are developed.

At a September Project Leaders meeting, a committee was formed to develop written suggestions for Denver on "To what degree should herbicides be used to manage weeds on FWS on lands?" Members on the committee were: Gary Huschle (wrote the final draft), Bill Berg, Dean Knauer, Delano Pierce, Dave Potter, Karen Smith, and Al Ludden. The report was submitted sometime in October, but how much influence it had on the FWS herbicide use manual is unknown.

### b. Grasshopper

No grasshopper complaints were received in 1986.

# 12. Wilderness and Special Areas

# a. 1986 Wilderness Burn

The plant growth in 1987 was greater than expected, producing very adequate cover for nesting in the spring of 1988. Puzzled as to why such a tremendous regrowth (little growing season moisture fell, but a continuous 1986 fall moisture occurred), I asked Dr. Lee Manske, North Dakota State University, who is studying range plant phenology. He discussed about carbohydrate storage and tiller bud production in the fall: when there is lots of fall moisture, grasses store abundant carbohydrates and produce lots of tiller buds for the next year's growth. This is presumably what happened. Although there was little spring moisture, tremendous grass growth occurred.

# b. Pest Control

Leafy spurge occurs on the wilderness area. In fact, more spurge is on the wilderness area than the rest of the refuge. Vehicles carrying Picloram liquid and pellets are used on large spurge sites. The refuge has been granted a waiver to allow use of vehicles on the wilderness area for spurge spraying.

# c. Air Monitoring

Class I air quality is required to be maintained (Clean Air Act) on national wilderness areas. The ND State Department of Health installed an Ambient Air Quality Monitor at LNWR headquarters in 1982 that measures levels of suspended nitrates and sulfates, and total suspended particulates. In January 1987, the old Hi-ball instrument was replaced with a  $\rm PM_{10}$  that measures Inhalable Particulates at 10 microns or smaller (24-hour  $\rm PM_{10}$  standard of 150 ug/m³ with no more than one expected exceedance per year, and 50 ug/m³, expected annual arithmetic mean). No official standard has been set by EPA. Suspended nitrates and sulfates are not measured by the PM-10, but sulfur dioxide, nitric oxide, and hydrogen sulfide are measured through other instruments. Since there is less than a years data available from the PM-10, no data are included in this narrative; the data are available on computer print-out.

FWS and ND State Department of Health, respectively, have \$26,000 and \$15,000 worth of equipment for continuous monitoring of sulfur compounds at LNWR (the Clean Air Act requires  $\rm SO_2$  to be monitored in Class I air quality areas). Results of 1986 and 1987 monitoring are shown in Tables 17 and 18. The Clean Air Act also requires NO $_{\rm X}$  (nitrous oxides) to be monitored. NO $_{\rm X}$  equipment was purchased in 1987, but delivery and operating problems prevented the instrument from being installed until November 1987. No print-outs are available. However, low levels of NO $_{\rm X}$  are being recorded, a surprise to ND State Department of Health.

An old problem has been solved. The coal stoker was replaced this year with two gas furnaces, one for the office and one for the shop. Refuge

furnaces should no longer influence the sensitive air monitoring equipment.

Table 17. Sulfur dioxide occurrence on LNWR, 1986-87a.

					Maxi	ma						
		#	1 -	Hour	3 -	Hour	24 -	Hour	Arith	1Hr	24Hr	Annl
Qt	Yr	0bs	1st	2nd	1st	2nd	1st	2nd	Mean	#>715	#>260	AM>60
1	86	1940	86	58	53	52	21	15	5	0	0	0
2		2165 2195	21 24	13 21	13 22	12 16	6 7	5 5	3	0	0	0
4	87	2194 2148	58 55	42 26	32 30	30 22	12 9	9	4	0	0	0
2 3 4		1779	18	16	13	11	5	4	3	0	0	0

a SO<sub>2</sub> NAAQS: 60 ug/m3 annual arith. mean 260 ug/m3 max. 24-hr concentra. not to be exceeded. 715 ug/m3 max. 1-hr concentra. not to be exceeded.

Table 18. Hydrogren sulfide occurrence on LNWR, 1986-87a.

		#			Maxim	a	Arith	Arith		
Qt	Yr	0bs	Min	1st	2nd	3rd	Mean		#>75	#>45
1	86	4309	0	0	0	0	3	0.00	0	0
2		4346	0	25	24	18	3	1.01	0	0
3		4396	0	17	17	11	3	0.61	0	0
4		4395	0	0	0	0	3	0.00	-	_
1	87	4301	0	0	0	0	3	0.00	_	-
2 3 4		3561	0	63	42	41	3	2.41	-	1

a H<sub>2</sub>S: 75 ug/m3, not to be exceeded more than twice/yr. 45 ug/m3, not to be exceeded more than twice in 5 consecutive days.

A request was sent to the ND State Department of Health for all computer print-outs on  $\rm H_2S$ , and  $\rm SO_2$  be sent to Wayne King, Wildlife Biologist, representing FWS in the National Park Service, for interpretation as to

whether the Class I Air Quality of LWA is being maintained. A report for 1986 and three quarters of 1987 was completed (appendix 4). "Based on our interpretation and analysis of the 1986-87 ambient air quality data for sulfur dioxide and hydrogen sulfide we would not expect these low level concentration values to adversely impact the air quality related values (flora and fauna) of Lostwood National Wildlife Refuge." The data being collected is excellent baseline data, and needs to be continued "for an additional 1-3 years." Two additional recommendations were: at the end of the 3-5 year monitoring period we should consider moving the equipment to another refuge within Region 6 to begin gathering baseline data, and compile a floristic lichen species list for Lostwood in order to identify the most sensitive bioindicator species (flora).

# d. Wetland and Precipitation Monitoring

Efforts were begun in 1986 to monitor Class III-A wetlands not only to protect wilderness wetlands but also because fresh water wetlands on the refuge are the first to be influenced by acid precipitation. See page 30 for details.

Rainfall of, 0.25 inches or greater, was analyzed. Results for the 1987 rainfall, minimal as it was, is presented in Table 19. No interpretation can be made with only one year's data. Rainfall less than 5.00 pH is more acidic than normal.

Table 19. Rain water chemistry on Lostwood National Wildlife Refuge with 0.25 inches or more of rainfall, 1987. Water analysis performed by EMIS, Camarillo, CA., through Minnesota Valley Testing Laboratories, Inc., Bismarck, ND.

				Dates of	Rainfal	) a			
Parameters	5 May	18 May	29 Jun	8 Jul	9 Jul	9 Jul	20 Jul	30 Jul	14 Aug
PHYSICAL (micr	omhos/c	m at 25	C)						
Conductivity	9.00	11.00	9.90	14.00	11.00	6.10	5.10	11.00	8.50
PΗ	5.24	5.65	5.05	5.11	4.94	5.27	5.30	5.65	5.55
COMMON IONS (m	g/1)								
Ca	0.359	0.412	0.227	0.654	0.150	0.129	0.084	0.404	0.298
Mg	0.083	0.103	0.057	0.131	0.030	0.031	0.022	0.077	0.094
Na	0.087	0.084	0.038	0.197	0.060	<0.025	<0.025	0.060	0.085
K	0.160	0.142	<0.025	0.077	0.037	<0.025	<0.025	0.062	0.079
Sulfate	1.458	1.184	1.418	2.430	1.321	0.594	0.411	1.530	1.497
Chloride	0.237	0.134	0.067	0.171	0.105	0.057	0.044	0.110	0.110
Acidity (ug) (as CaCo3)	0.034	0.046	0.040	0.047	0.038	0.035	0.034	0.044	0.030
NUTRIENTS (mg/	1)								
Nitrate- Nitrogen	1.165	1.574	1.418	1.900	1.026	0.986	0.580	1.530	1.497

<sup>&</sup>lt;sup>a</sup> 5 May= 0.27 inches, 15&16 May= 1.00 inches, 29 Jun= 0.29 inches, 8 Jul= 0.26 inches, 9 Jul= 0.32 inches, 9 Jul= 0.34 inches, 19&20 Jul= 1.80 inches, 30 Jul= 0.74 inches, and 14 Aug= 0.49 inches.

Runoff from snowmelt, if acidic, can have destructive results to fresh water wetlands. Several references state that if trace minerals and acids build up at the bottom of the snow column and at the first stages of snowmelt, acid "shock" in wetlands can occur at runoff, adversely affecting aquatic life. To see if acids and trace minerals occur in greater concentrations than normal, snow column sites were established in the fall of 1986. No snow fell and remained for any length of time, thus no snow columns were collected in 1987.

#### e. General

A ditch that drains a large Class III-B into a Class IV-B, dug by beaver, was filled by hand this summer.

Visitors seldom come just to walk the wilderness area. Mr. V. Ames walked there, and took the time to write a message in the "message box" saying how much he enjoyed the wilderness.

#### G. WILDLIFE

# 1. Wildlife Diversity

Before reading further please read, if you have not already, Habitat General, Grassland, and Prescribed Burning general sections. They give insight to the ecosystem management we are striving to attain. The ultimate aim of the current management program is to return abundant native grasses and forbs, with young growth of western snowberry scattered in small patches composing 20-30% of the upland. This should create diverse habitat that will be attractive to native fauna and other wildlife.

According to Wildlife Objective #3, four species of birds considered rare with potential for re-establishment on LNWR are: northern greater prairie chicken, greater sandhill crane, trumpeter swan, and burrowing owl. The only current effort for meeting this objective is to reduce snowberry and increase native grasses and forbs. The western burrowing owl may return on its own once grassland is re-established since these owls naturally reproduce on scattered locations in northwestern North Dakota. All other species may be reintroduced if vegetation conditions meet the species' needs.

A new species for LNWR, and for northwestern ND as well, was reported in 1986: the wood frog (Rana sylvatica). Robert Murphy published a note on the record in Prairie Naturalist (appendix 5).

In 1987, another new species for LNWR was observed crossing Tower Road just south of Tower Slough, the western painted turtle (photo #15). It was likely an adult since it's palastron was seven inches long. LNWR lies well withing the turtles range, and it has been reported for the northwestern part of the state, but has not been recorded previously on the refuge.



Photo #15. The first recorded western painted turtle for Lostwood NWR was found crossing a refuge road.

A-g-5

July 1987 KS

#### 2. Endangered Species

#### a. Raptors

A Mountrail County farmer called Lostwood about a dead bald eagle he observed underneath power lines along old highway #2. The bird was picked up William Skar, Special Agent, Minot ND, who took the bird from Lostwood, had it inspected, and found no pellets in the carcass. Electrocution was determined to be the cause of death.

The mild fall in northwestern ND created conditions that were attractive to bald and golden eagles. Sightings of eagles from local people were common through fall and early winter. In fact, so common, that a bald eagle depredation complaint was received at Lostwood, a first. A Burke County neighbor about 10 miles west of Lostwood, had various tame fowl roaming about their farmsite. The farmsite is adjacent to several Class IV wetlands surrounded by mature aspen groves. They had lost six large white tame geese when several bald eagles were present, but one immature eagle lingered. The owners of the geese did not care to loose any more.

Plans were discussed with the Special Agent in Minot to attempt to trap and move the one eagle, but first we asked the owners to try to confine their fowl. They got lucky and gathered all their fowl into a barn. About a week later the bald eagle had departed and all was well again.

Lostwood's mild fall attracted the largest concentration of snow geese in history, all on Thompson Lake. Two things accompanied this concentration: bald and golden eagles, and "boundary" goose hunters (Homo sapiens type). Since lead shot is still used here, and since many crippled geese were along the lake shoreline, a news release (appendix 6) was sent to local newspapers (all printed the article) about potential lead poisoning to eagles. Some comments were received by locals about the news article; most were unaware of the dangers to eagles. Finally, in late November, Thompson Lake froze, and the snow geese departed, leaving behind wounded birds that were consumed by coyotes, eagles, and snowy owls. The last bald eagle departed about mid-December, while golden eagles remained throughout northwestern ND until cold weather hit in early January 1988.

Peregrine falcons were observed by R. Murphy in the Lostwood area on four occasions in May.

#### b. Piping Plover

Piping plover habitat is monitored yearly to determine the population of territorial birds. A summary from 1984-87 is presented in Table 20.

Table 20. Piping plover territorial population, included males and females, on LNWR in June, 1984-87.

Year	LLC	SSL	ULL	Total
1984	16	0	5	21
1985	3	8	6	17
1986	7	4	11	22
1987	9	2	10	21

LLC: Lower Lostwood Complex SSL: School Section Lake ULL: Upper Lostwood Lake

Some plover nesting sites are successful each year, others are not, and other areas appear good but do not attract plovers. We are attempting to increase the piping plover breeding population on LNWR. A piping plover research plan was written by the manager, proposing to: 1) monitor breeding populations and water chemistry, and 2) enhance habitat that currently is not being used by plovers, (map 4). Not enough money was secured for a graduate student, so volunteer/intern, William Veihl

was given the massive project. (The volunteer is writing a summary of the summer's work for a school paper). Much was learned, but it is preliminary. We need 2-3 years of graduate study to determine the best ways to increase the breeding population on Lostwood (Dr. Mark Ryan, University of Missouri-Columbia has been working with piping plovers for several years and has expressed an interest to assist Lostwood with our work; Dr. Ryan has students studying "pipers" at the Chain-of-Lakes).

The 1987 monitoring efforts located ten nests: five hatched, three were depredated, and two were abandoned, locations are described in Table 21. (The entire refuge population was monitored weekly, care taken to keep disturbance to the minimum using recommendations from Paul Mayer, a graduate student studying piping plovers at the Chain-of-Lakes) located about 100 miles south of Lostwood.

Table 21. Nest locations and fates of piping plover nests (n = 10) on LNWR, 1987.

Location	Status		
Upper Lostwood Lake:			
West Bay: Site #3	Hatched		
Site #5	Hatched		
East Bay: Site #1	Hatched		
Site #2	Hatched		
Peninisula #2	Destroyed		
Piping Plover Wetland: Northwest Shoreline Southeast Shoreline	Hatched Abandoned <sup>a</sup>		
School Section Point: Pecker Point	Destroyed		
Salt Wetland: Northwest Shoreline North Shoreline	Destroyed Abandoned <sup>b</sup>		

a Nest was abandoned when found, and contained four eggs.

Water quality was assessed at plover breeding sites. Alkalinity, conductivity, dissolved oxygen, and pH, were determined from water samples taken one foot from shoreline. All data are preliminary. The data suggests that pH may be one limiting factor that affects plover's affinity to a wetland; pH for all sites was between 8.87 to 9.99, a limited range. These measurements included two sites on the Lostwood

b Nest bowl had no eggs, and was abandoned when the wetland went dry.

Wetland Management District, ND#2 and Bloom WPAs. (These sites attracted plovers when island construction in the wetlands created exposed shorelines.) The pH for these two sites were 9.75 and 8.87 respectively.

Experiments to increase piping plover nesting on unsuccessful sites were: (1) add gravel and cobble to shorelines, (2) prescribe burn, (3) construct predator proof fence, and (4) spray salt water (the adjacent's lakes water) on vegetated shorelines. Gravel and cobble was added to three locations during the winter months: southern tip of Lower Lostwood Lake, southern shoreline of the west bay, and along the shoreline of Upper Lostwood Lake (map 4). The Lower Lostwood Lake site, after thawing, upheaved into massive ruts (it is confusing as to why this happened), making the site even less attractive to plovers. On Upper Lostwood Lake sites, no birds were observed along the lake's shoreline, and one pair successful hatched a clutch of four eggs along the south shore of the west bay.

The entire west shoreline of Upper Lostwood Lake was prescribe-burned on 24 April to remove tall plant litter along the shoreline. The burn area included a piping plover site that is successful each year; it was successful in 1987. Peninsula #2, Upper Lostwood Lake, has never been known to be attractive to a pair of plovers. A pair was attracted to the site, and was incubating four eggs before it was destroyed by a predator. The pair that were nesting on peninsula #2 were also observed on peninsula #1.

A "predator proof" fence (2"x4" mesh size) was constructed across the south peninsula of west bay (Upper Lostwood Lake). One pair successfully raised young within the enclosure; is one of the three graveled and cobbled sites (map 4).

Salt water from adjacent saline wetlands was sprinkled onto shoreline vegetation to inhibit its growth (photo #14)(at one point in time, some piping plover research proposals suggested herbicides for retarding vegetation growth). Sites that salt spray was applied are shown on Map 3. If no rain fell while applying the salt water, a white coating formed over the growing plants. The only plant that immediately responded was Canada thistle; it wilted. What effect the spray had on future plant growth will be assessed next year.

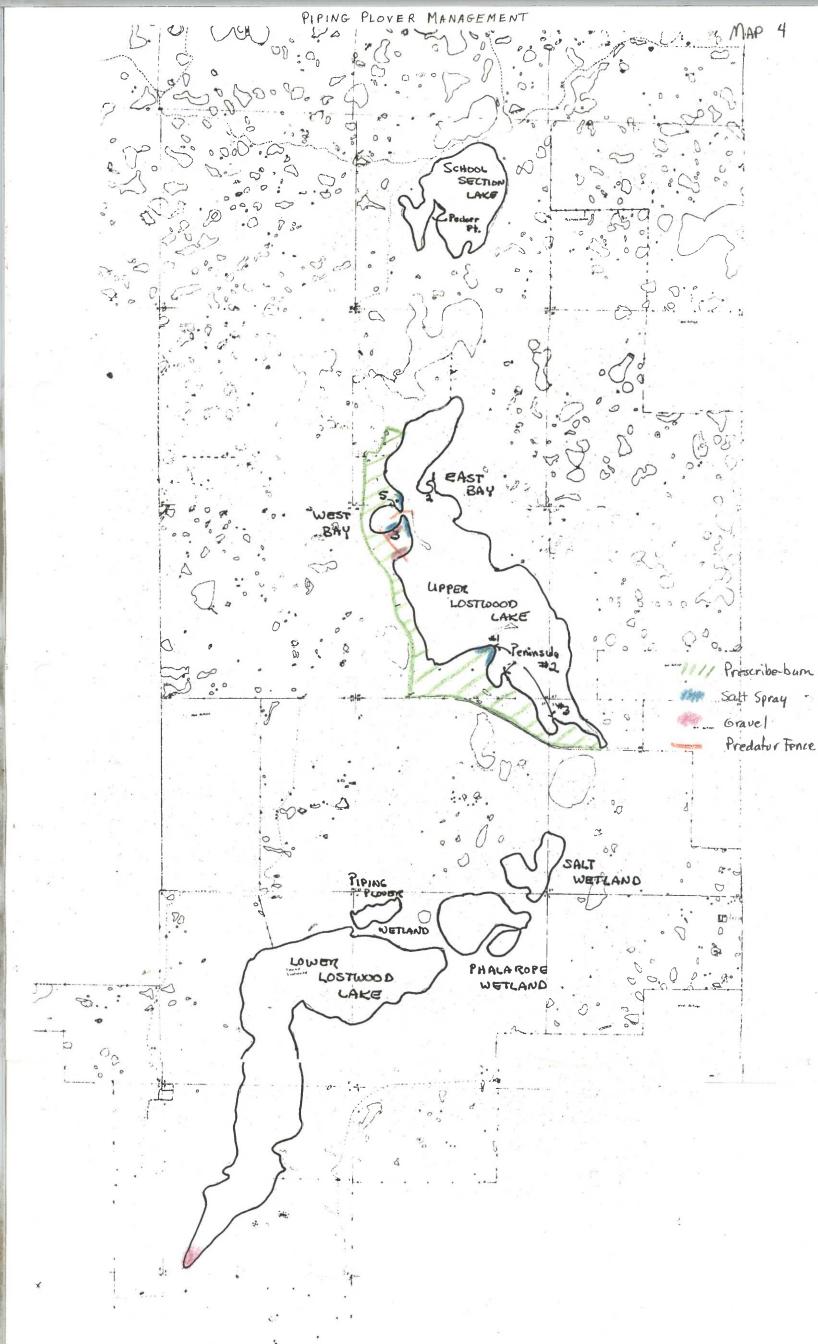




Photo #16. Lostwood has a stable breeding population of piping plovers. Additional suitable nest sites can be created on LNWR. Two techniques being tested are: 1) add gravel onto shorelines that lack sufficient gravel base, and 2) sprinkle salt water from adjacent wetlands onto shorelines to inhibit vegetation growth. This site, shown here, had gravel applied during winter months. A pair of piping plovers were attracted to the site and successfully raised four young. After the birds were gone, salt water was sprinkled to inhibit (hopefully) plant growth on the fresh gravel.

C-133

August 1987 TM

Our attempt to increase the total number of paired piping plovers in 1987 than in previous years failed (Table 21), but two sites, never known to be used before, were used by breeding pairs of piping plovers. One might ask, do plovers colonize new areas readily? According to Mark Ryan's work at the Chain-of-lakes, they pioneer easily to sites "close" to established sites, but may not pioneer as easily to sites further away. But a banded bird was observed on Piping Plover Wetland with four seven day old chicks. The color coded bands identified the bird as banded at the Chain-of-Lakes in 1986, as a juvenile.

Mark Ryan's graduate student, Paul Mayer, assisted the Lostwood crew in many ways. The sincere interest that Paul has towards the welfare of the plover is evident in the help that he gave from his very busy schedule of work at the Chain-of-lakes. He and a summer assistant trapped and banded three adults on Lostwood (Photo #15). Right legs are banded with the standard FWS band, a green flag (designates banded in N. America), and a black band (designates Ryan's permit); and left legs are marked for individual identification. The three adults banded on Lostwood have FWS and Individual bands as follows:

1) FWS 991-70329, and color bands brown, yellow, and gray, trapped on Upper Lostwood Lake, West Bay, Site #3 on 28 May. 2) FWS 991-70330, and color bands brown, yellow, and yellow, trapped on Upper Lostwood Lake, East Bay, Site #2 on 28 May. 3) FWS 991-70331, and color bands brown, green, and gray, trapped on School Section Lake, Pecker Point on 28 May.



Photo #17. Paul Mayer and his assistant banding an adult plping plover on Pecker Point. Several important plover behavior patterns that can help the species is being discovered through such banding efforts.

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#### 3. Waterfowl

In 1987, waterfowl arrived about two weeks above normal. Some early arrival dates are: giant Canada geese- one on 9 Feb. and eight on 6 Mar., one swan on 7 Mar., three pintails on 11 Mar., and one mallard on 1 Apr.

#### a. Ducks

Duck feeding behavior in early spring was, perhaps, more "normal" this year than in any spring since 1978. Mallards and pintails continued to use wetlands for feeding throughout the breeding and early nesting season; in other years, stubble fields commonly were used. There was no late snowstorms, and temperatures remained above freezing most nights and days, plus very little run-off occurred. Wetland water temperatures presumably remained higher than in previous years, allowing invertebrate

activity to continue. No snow pack occurred in the winter of 1986-87, so that if "acid shock" is occurring in snow pack years in northwestern North Dakota, it would not have occurred in the spring of 1987 (see page 49). Also, the early 1987 spring attracted twice the number of mallards than in 1986.

A summary of the number of pairs and production from 1984-87 is presented in Table 22. In 1979, a high water year, there were an estimated 9640 pairs and 39,736 ducks produced; mallard and pintall numbers were 2014 and 417, and production figures were 7895 and 2335 respectively. The poor runoff years, 1980-87, produced low wetland water levels and fewer ducks. Pair counts are based on censuses conducted twice each year on 17 randomly selected quarters. The brood counts are based on censuses conducted twice each year on the same 17 quarters (in 1986, only nine quarters of the 17 quarters were censused, a random selection made in 1978).

Table 22. Duck pairs and production on LNWR from 1984-87.

Species	1984		1985		1986		1987	
	Prs.	Pro.	Prs.	Pro.	Prs.	Pro.	Prs.	Pro.
Mallard	1087	2677	1136	1999	756	2041	1363	3323
Gadwall	1343	2063	1442	1546	878	2318	1081	2975
Wigeon	792	2156	558	821	415	1096	724	2854
G-w. Teal	67	235	82	314	175	539	156	284
B-w. Teal	1655	3212	1778	2240	1430	4368	1489	3341
Shoveler	621	559	476	262	307	774	382	1108
Pintail	166	332	240	540	74	195	157	403
Redhead	83	50	74	4	50	132	141	118
Canvasback	74	134	25	10	9	20	50	150
L. Scaup	995	716	929	897	514	1357	730	2851
Ruddy Duck	398	0	141	0	50	0	50	40
R-neck	25	0	33	0	9	0	9	0
Bufflehead	58	0	33	0	0	0	0	0
Total	7364	12104	6947	8633	4658	12840	6332	17447

The 1987 production (flight stage) figures may be a little high because there were more than normal numbers of class I broods in the first brood count. With the extremely low wetland water levels, lots of broods would have to travel farther to brood waters than in other years. The first brood count, 7-9 July, had 2220 brood for the refuge, while in 1985 and 86, 1350 and 870 broods respectively were counted between 15-18 July of both years. The second brood count for 1987, 7-11 August, had 1000 broods, while in 1985 and 86, 740 and 410 broods respectively were counted between 15-18 August of both years. There were definitely more

broods in 1987 but it is doubtful whether the average brood made It to flight stage.

Information on hatching success on various management treatment areas is found on pages 4-6 and 36-37.

Over the last two years, slides of age classes of all species that nest on Lostwood are being gathered. Photo #18 shows a Class IIa gadwall, and the style of pictures we are trying to get. This will hopefully help summer employees and future managers become quicker at identifing ducklings.



Photo #18. Slides are being compiled on all age classes and species of waterfowl young produced on Lostwood, to help new employees become better at identifing ducklings.

A-a-b-25

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#### b. Geese

Glant Canada geese (<u>Branta canadensis maxima</u>) are being monitored from a pair survey conducted on 75 stratified, random 40-acre plots. The number of pairs found from 1983-87 are: 162, 54, 68, 48, and 122 respectively.

Nesting Canada geese are selecting upland sites, as they did historically. Upland nests are stumbled upon each year, and appear to have about the same hatching success as ducks. Flax bales were tried in the late 1970s and early 1980s with varying success. The years flax bales were being placed on the refuge, upland nests were also being found, with a hatching success similar to the duck success. Since the geese can find their own nest sites, are well established on Lostwood, and nesting structures are needed on private lands more than on

Lostwood, it is better to invest in this management technique on private lands.

A new snow goose peak number was reached in 1987. There were 50,000 snow geese using Thompson Lake for about a three-week period. The prolonged fall seemed to attract more birds than usual to our area.

### c. Swans

About 100 swans stayed on the northeast bay of Thompson Lake throughout most of the fall till freeze up. The bay was shallow, and swans could "tip-up" and reach the bottom throughout the entire bay.

# 4. Marsh and Water Birds

A colonial nesting bird census was completed in 1984-87, by walking the shoreline of School Section Lake, Upper Lostwood Lake, Iverson Slough, Thompson Lake, Knudson Slough, Rock Slough, Bulrush Slough, Elbow Lake, Tower Slough, and Lower Lostwood Lake and Complex. The only species observed during the 8-18 June census was eared grebes, 115 individuals. White pelicans were observed after the census.

# 5. Shorebirds. Gulls. Terns and Allied Species

A census for shorebirds, gulls, and terns was completed in 1984-87 by walking the shorelines of lakes and wetlands identified under Marsh and Water Birds (1987 results in Table 23). Two other wetlands were walked, Bulrush Slough where one gull was observed, and Tower Slough where one killdeer, one Franklin's gull, and four willets were observed.

Wilson's snipe are observed annually in their aerial courting flights during the breeding season. A nest was found in the early 1980s but never photographed and recorded. Two nests were found in June 1987, and photographs were taken. This species was recorded in Stewart's "Breeding Birds of North Dakota" as a breeder in Mountrall County, but no record for Burke County.

Table 23. Shorebirds, gulls, and terms observed results for LNWR, 1987.

Species	School Sec. Lake	Upper Lost. Lake	Thomp. Lake		Lower Lost. Comp.		Iverson Slough
Spotted sand. Cal. & Herring	0	23	5	0	1	0	0
gull	0	40	0	0	0	1	1
Ring-billed							
gull	7	72	15	5	0	1	0
Black tern	0	0	8	0	4	0	0
Killdeer	5	33	30	0	16	9	5
Wilson's phal.	11	41	37	0	63	9	0
Marbled godwit	1	7	3	0	0	2	6
Willet	5	2	5	1	3	2	1
Upland sand.	0	1	1	0	0	0	0
Northern phal.	0	0	0	0	4	3	0
"Peeps"	0	0	84	0	100	0	0

# 6. Raptors

Nine randomly selected sections (20% of the refuge) were surveyed for stick-nesting raptors and corvids in 1982-87. The entire refuge was searched for the same species by Murphy on his own time from 1983-87. Comparison of the nine section survey and the actual number of occupied nest areas for 1983-87 is shown in Table 24.

Table 24. Numbers of occupied nest areas of stick-nesting raptors and corvids, 1983-87. Numbers in parentheses indicate estimates projected from a 20% random sample of LNWR.

Species	1983	1984	1985	1986	1987
Red-tailed hawk	22(25)	22(20)	26(35)	29(30)	23(20)
Swainson's hawk	5(15)	7(5)	4(5)	5(0)	
Ferruginous hawk	0	0	0	0	0
Cooper's hawk	0a	1(5)	1(5)	2(5)	2(5)
Long-eared owl	0	2(5)	0	3(5)	2(0)
Great horned owl	>3 <sup>b</sup>	>3 <sup>b</sup>	14(10)	13(10)	17(20)
American crow	12(10)	9(10)	10(10)	11(15)	4(5)
B1-billed magple	5(5)	3(5)	8(5)	14(10)	11(10)

aOccupied by a single adult in 1983.

bIn 1983 and 1984, an early census was not conducted for great horned owls and, presumably, most nest areas abandoned before the late May-early June census were not detected.

Five northern harriers and no short-eared owls nested on the 1200 acres of NPWRC research fields in 1986. Additional information on raptors is found on pages 7-10.

Seven young long-eared owls from two nests were banded (Photo #19). One nest was in an old magpie nest (which was also used by long-ears in 1986) and the other in an old crow nest.



Photo #19. Martin Folk and Robert Murphy banding a young long-eared owl.

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Each year injured raptors and other birds are brought to Lostwood. "Housing" quarters were needed for holding raptors until they could be released, or transported to a rehabilitation center. During the winter-spring of 1987, a raptor "mews" was built to house these birds (Photo #20). A basic plan for the building is shown in appendix 7 (if more information is desired, contact Lostwood).



Photo #20. A raptor "mews", designed by Robert Murphy (a falconer), to temporarily house injured raptors and other birds.

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### 7. Other Migratory Birds

Passerine transects were completed on two burn areas. The information is found on page 39. Mike Green completed a census of true grassland species on Thompson Lake Burn; summary is on pages 10-13.

One birder that visited LNWR in 1987 was so intrigued by its the unique prairie setting and bird species that he wrote an article about LNWR's features in "Birder's World," November/December 1987 issue, a very subtle article. Within this article he talks about the diversity of true grassland species, especially the "Little Gray Birds," the sparrows (a copy of the article is in appendix 8).

On 29 January, six rusty blackbirds were observed at refuge headquarters, an unusual winter visitor.

The early spring brought a variety of early migrants besides ducks: robin 10 Feb, crows 16 Mar, ring-billed gulls 19 Mar, and western meadowlark 24 Mar. One of the earliest state record arrival dates for willow flycatcher was 11 May, and second earliest record for Sprague's pipit was 15 April, both observed on LNWR in 1987.

### 8. Game Mammals

Only two or three white-tailed deer were killed by vehicles on State Highway #8 in 1987. Fewer road killed deer may reflect the decline in

deer populations. Something unusual has happened to deer in southern Burke County, including the refuge. For example, every winter since 1978, a minimum of a dozen deer feed in and around refuge headquarters: In 1985 and 1986 as many as 40 were present. This year, none. There have been reports around the refuge die-offs, but no groups of dead deer have been found on the refuge. November deer hunter complained of low deer numbers (page 72).

### 10. Other Resident Wildlife

### a. Sharp-tailed Grouse

Table 25 shows the lek counts from 1979 to 1987, and map 5 indicates lek locations.

Table 25. Sharp-tailed grouse lek counts, LNWR, 1979-1987.

Year	No. of Leks	No. of Males	Ave. No. Males Per Lek
1979	32	325	10.2
1980	37	644	17.4
1981	40	764	19.1
1982	38	435	11.5
1983	37	528	14.3
1984	34	686	20.2
1985	36	510	14.2
1986	35	638	18.3
1987	36	736	20.4

The first "very rough" draft is done on an analysis of sharp-tailed grouse response to land management practices on Lostwood from 1962-65 compared to 1979-85.

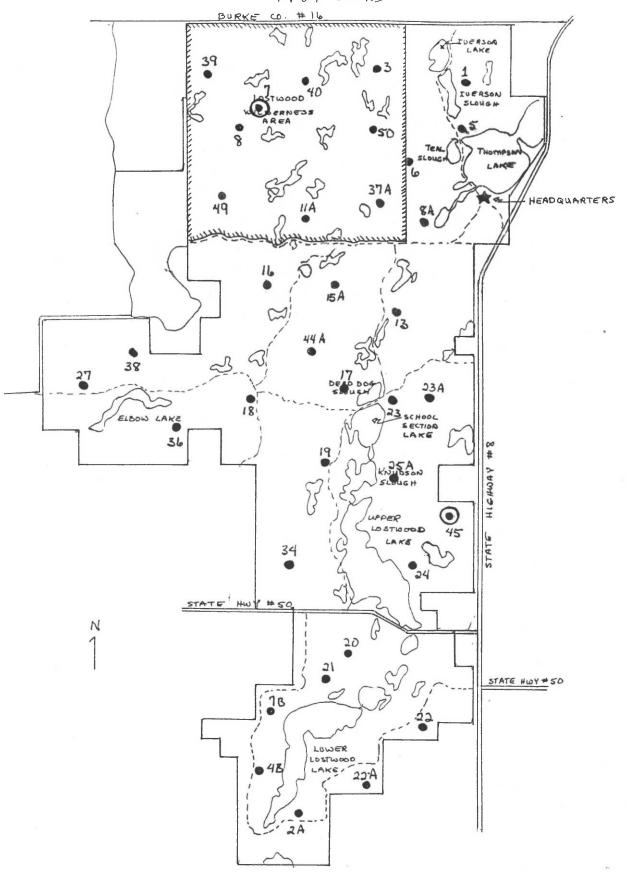




Photo #21. Lek #8A, in the middle of Teal Slough Burn, had the greatest number of males of any 1987 lek. Eight males and one female are shown here, the other 31 males are scattered around the blind (the canvas blind is located over a badger hole, in the center of the lek). This area was prescribe-burned in 1980, 1983, and in the summer of 1987.

April 1987 KS

The 1220-acre Teal Slough Burn, burned in 1980 and 1983, had 94.6 acres searched for nests in 1979 by NPWRC's nest dragging crew. One sharp-tailed grouse nest was found. In 1987, the same area was searched again by NPWRC, and 13 sharp-tailed grouse nests were found; hatching success was 100% and 84% respectively. Sharp tails are strongly attracted to burned areas. Nesting hens are found in greater numbers, and brood use is greater than on idle areas (NPWRC unpublished data from Research Project 924.02).

### b. Other Species

The fourth Jackrabbit census was completed in 1987 (Table 26). The census is conducted to monitor jackrabbit populations to determine if the prescribed burning program will effect the population. It appears that jackrabbits may increase on burn areas but more data is needed. Jackrabbits are a source of food for coyotes and great horned owls. If jackrabbits increase, this alternate food source may reduce predation on nesting waterfowl.

Table 26. Number of white-tailed jackrabbit observations per mile on entire census route, and burned and unburned portions of route, LNWR. 1984-87.

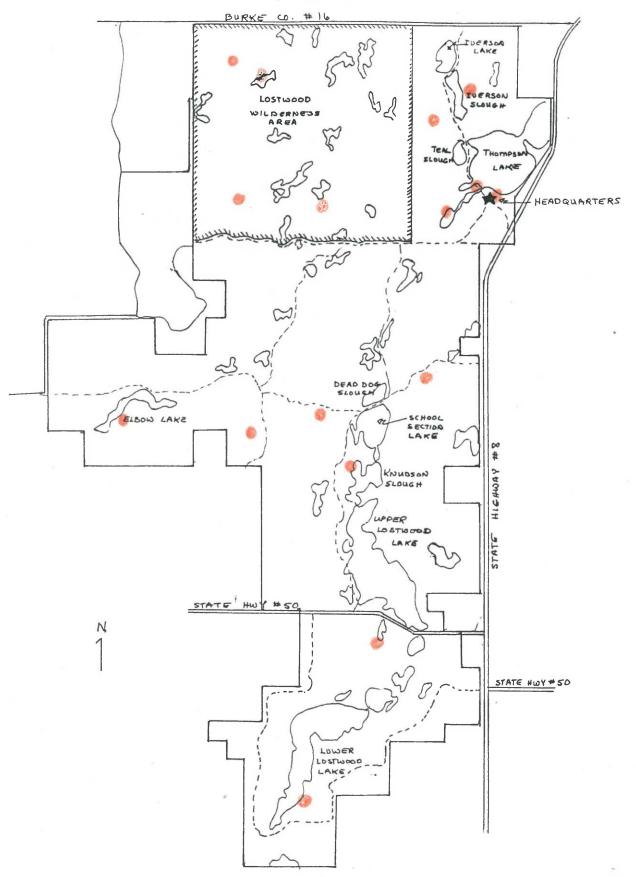
Number	of.	observat.	ong/mi	10
number	OT	observat.	1002/01	16

Year	Entire	Rt. Burned	Unburned	-
1984	0.20	0.74	0.07	
1985	0.30	0.11	0.00	
1986	0.13	0.37	0.00	
1987	0.18	0.32	0.09	

Beaver populations appeared to decrease during the dry years from 1982-87. Beaver colonies are noted while doing other refuge work. Beaver colony locations from 1987 are shown on map 6. (According to the literature there are no valid estimates of average beaver colony size in prairie habitats). Beaver also are a source of food for coyotes when they traverse across uplands going to food sources, or seeking wetlands with water.

It is important to monitor wild can'd populations because they are the main predators of ground nesting birds. Also, coyote and fox distribution can affect research project 924.02. Alan B. Sargeant (NPWRC), Jerry Showmaker (ADC), Robert Murphy, and Karen Smith worked out methods and an agreement to continue a spring aerial census of can'd dens on most of LNWR and some of the surrounding area. Jerry Shoemaker and Robert Murphy conducted the survey on about 12 June 1986. There was a fox den, and five coyote dens (the one fox den was squeezed between two coyote dens) found on the central portion of the refuge (the extreme south, north and west sides of the refuge were not systematically flown due to money constraints). There was one fox den and one coyote den just off the refuge. Map 7 shows the coyote and fox den locations.

One food Item preferred by canids and raptors is mice. In order to monitor this population along with reptiles and amphibians (which are sensitive indicators of environmental quality) "drift fences" are used. In 1984, experimental drift fence stations were installed at two sites to assess their efficacy in monitoring trends and determining composition of small ground-dwelling vertebrates in mesic sites at LNWR (see 1984 and 1985 narratives). Modifications of trap designs were made in 1985, the two stations were moved, and three stations were added for a total of 300 m of fence (20 15-m sections). The five drift fence stations, each composed of two 30-m fences, were installed in representative mesic habitats in the refuge center.



In 1985-87 drift fences were opened during 15 May-4 July, for an annual total of 1000 drift fence nights (20 15-m sections x 50 days/nights)(Table 27). Although 1984 drift fences were moved and three stations were added, relative changes in indices of common small mammals - voles and jumping mice - probably reflect actual population changes for these species. Data for voles are supported by field observations and an annual snap-trap census. Vole populations on LNWR apparently reached "moderate" levels sometime during late summer-winter 1984. Reproductive data from voles captured in summer 1984 suggested an increasing population. After snowmelt in spring 1985, extensive girdling of snowberry and silverberry stems by voles and widespread vole runways and dung piles were evident. However, during summer 1985, few voles were observed, no breeding long-eared or short-eared owls occurred, and numbers of breeding harriers decreased from 1984, all indicative of a vole decline. Vole numbers appeared unchanged or only slightly higher in 1986; corresponding breeding short-ears were not present, only two long-ear pairs were known to attempt nesting, and numbers of breeding harriers appeared lower than in 1985. Vole numbers increased in 1987 to slightly higher than in 1984. Voles were observed In heavy litter areas, and the number of breeding harriers increased slightly from 1986.

The higher vole population is correlated with a higher hatching success for ducks in 1987.

Table 27. Composition and relative abundance of small mammals, reptiles, and amphibians in mesic sites, determined by drift fence sampling units, early summer, LNWR, 1984-87.

	Cap	tures/100 I	)F nights <sup>a</sup>	
Species	1984	1985	1986	1987
Masked shrew	5.9	1.8	7.3	9.6
Arctic shrew		0.2	0.6	4.0
Short-tailed shrew	0.4		0.2	0.2
Pygmy shrew		0.1	1.3	0.7
Peromyscus spp.	4.0	0.5	1.7	1.2
Meadow jumping mouse	9.4	16.2	16.5	15.6
Meadow vole	19.9	3.6	4.6	21.1
N. red-backed vole	0.4	0.3	0.8	0.1
Thirteen-lined g.squirrel		0.4	0.4	0.6
Franklin's ground squirrel		0.2	0.1	0.1
Richardson's g. squirrel			0.1	
Least weasel		0.3		0.1
Plains garter snake	0.4	0.3	1.4	1.5
Smooth green snake	three water		0.3	
Tiger salamander	2.0	0.5	0.9	4.2
Chorus frog	3.5	1.0	3.9	6.5
Leopard frog		8.0	0.9	2.4
Misc. bird spp.	0.4	0.1	0.2	1.9
Total drift fence nights	256	1000	1000	1000
Total captures	118	335	412	698
Captures/100 DFN's	46.1	33.5	41.2	69.8

<sup>&</sup>lt;sup>a</sup>A drift fence night = a 15-m section of fence open for 24 hours.

Drift fences, located in mesic sites, probably does not represent small mammal composition on xeric sites, and a single technique alone probably does not accurately document composition and abundance. Joy Albertson, a volunteer/intern, took on a challenging project of documenting small mammal composition and abundance in native mesic and xeric sites using a different technique, snap trapping. She then compared the drift trap and snap trap results. She has completed a publishable paper, that was also used for as a class project. When she publishes the paper, a copy will be included in the narrative.

Altered excerpts from her paper are presented here.

Three species of mammals were captured using snap traps: meadow voles, deer mice, and masked shrews; all were found in both mesic and xeric habitats, but species diversity differed.

These differences probably are due to an actual variation in habitat preferences between species. Deer mice usually do not exist in marshy areas, preferring upland habitats with moderate vegetation cover. Meadow voles typically inhabit marshy areas, preferring lush, dense vegetation of grasses, sedges, and rushes. Both the total trap success in mesic and abundance of meadow voles in xeric probably were elevated this year due to relative high numbers of meadow voles.

Drift fence data appear different from snap trap data gathered in similar mesic sites. Eight species of mammals were captured in drift fences, only three of which were caught in snap traps. Short-tailed, artic, masked, and pygmy shrews compose 27.6% of drift fence captures, but appear to be grossly under-represented in the snap trap data. Cricetid rodents may be undersampled in drift fences due to use of visual cues for orientation. A notable exception to reduced susceptability to pitfall traps is the meadow jumping mouse. This species was quite abundant in drift fence captures, while none were caught in snap traps. The high total. diversity index of drift fence (0.71) compared to snap trap (0.04) for mesic habitats is the result of its greater effectiveness in catching a wide variety small mammal species.

Both trapping methods are biased to certain species. Used alone, drift fences may over-sample the insectivores and zapodids while trapping only moderate numbers of cricetids. Snap traps would effectively capture cricetids, but other groups would be under-estimated. For these reasons, I would recommend the use of both trapping methods to facilitate accurate data collection.

Joy also mounted voucher specimens for every small mammal (except bats) on the refuge. She cataloged, by museum standards, all species collected, and took voucher specimen skulls to her college, North Dakota State University (NDSU, Fargo) in the fall for processing. Thanks to Joy, there are now voucher specimens of nearly all small mammals on LNWR at the University of North Dakota (Grand Forks), NDSU, and LNWR.

### c. Insects

Dr. Ron Royer, Minot State University, obtained a permit to collect insects on FWS in northwestern ND. He collected near LNWR on several occasions. A copy of his findings, some which are new records, is in appendix 9.

### 15, Animal Control

No animal damage control work was done on LNWR in 1987.

### H. Public Use

### 1. <u>General</u>

On 22 October, Steve Bradley, an exceptional science teacher at Tioga High School, brought 12 students for a tour of Lostwood's management and overall objectives of National Wildlife Refuges.

A Grand Forks high school advanced biology class visited Lostwood in April for an outdoor experience. A general introduction was given, and a map showing interesting locations. One of the outdoor experiences was to learn to use a compass, some got lost but were recovered quickly.

A girl scout project Karen Shoemaker had was to interview a land manager; she came on 19 November to headquarters. She had several interesting questions, and also requested scout projects to complete. Robert Murphy and I helped her get started on three projects: building kestrel boxes for use on private lands, placing bluebird boxes on the refuge, and completing two simple breeding bird transects.

Kim Fundingsland, producer of "Outdoors with Kim Fundingsland" (a program shown on several TV channels in ND, South Dakota, and Montana), filmed five subjects on Lostwood for his program. Mike Green presented true grassland species information using grassland sparrows as the photogenic key; Bill Veihl briefly explained his work with piping plovers (Photo #20); and the refuge manager gave three programs, (1) overall management objectives of LNWR, (2) prescribed burning program objectives, and (3) public use opportunities. Kim does a splendid job of increasing public awareness of wildlife values of ND.



Photo #22. Kim Fundingsland and William Veihl head for Piping Plover wetland to record a program on piping plovers, a species unique to North Dakota's great outdoors. It was a long trek with heavy cameras over the shoulders.

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An article, entitled "Natural Areas Publication for North Dakota Outdoors magazine, a ND Game and Fish Department publication, is being prepared by Pam Dryer, Natural Resources and Trails Coordinator. This issue, to be published in 1988, will be devoted to natural places in ND where the public can see wildlife. Numerous refuges are included in this article: Lostwood was one, and an article was completed in 1987. In the 1988 narrative, a copy of the article will be included.

Lostwood's "Headquarter Design Plan" was completed.

Two "grassland tours" were given for the public on 22 August 1987 to view burned and unburned areas of the refuge. A school bus was rented for a three-hour morning tour. Nine local people attended. A horseback tour was given for three hours in the evening to nine different people. A leaflet package was given to each participant that included a map of the tour route, and an outline of the land use history of the areas visited. Donuts and coffee were provided after the bus tour, and barbecue and potato chips with beverages (manager's expense) were provided after the horseback tour. News releases (copy in appendix 9) were used to attract people to the tour; however, I would like to see more people attend. Television was tried this year to advertise the tour; it had slight success. The greatest success was when Robert Murphy sent personnal invitations to people on his study area (west of the refuge). This may be tried next year on a broader scale.

### 5. Interpretive Tour Routes

One group of boy scouts used LNWR's tour leaflet that was completed in 1986.

### 8. Hunting

The average number of hunters appeared on the opening weekend of the grouse season, 12-13 September. There were 20 hunters on the 12th that harvested about 54 grouse; on the 13th, about 12 hunters were present, but the number of birds taken is unknown. It is estimated that about 65 grouse were harvested on the opening weekend. The nice weather and high hunter success on the opening weekend, and the continuing nice weather brought grouse hunters out for about three weeks after the opener. Lots of grouse were harvested since I received reports of hunters "bagging out" most of the time.

The gun deer season (6-30 November) saw nice, clear days throughout most. There was little snow, but hard frosts were heavy on mornings during the second half of the season. There were 200 hunters on the opening weekend (108 hunters on the 6th, 60 hunters on the 7th, and 32 hunters on the 8th). The known kill was 20 deer. Hunting pressure died rapidly because of the lack of deer being seen. Many hunters inquired about what happened to the deer. There were two areas where deer could be seen, but few were observed over the rest of the refuge. The low number of deer harvested on the opening weekend suggests that few deer were present.

A cow elk was observed on the refuge throughout the deer season.

A Special Use Permit for gun hunting deer on the refuge from a vehicle was granted to Obert Kallberg because of his state Disability status. Everything went well until we realized he was using other hunters to push deer to him (he would drive his vehicle so he was in front of approaching hunters), and that he passed up various bucks, waiting for the "big one." He also decided one nice Sunday towards the end of the season to take an afternoon drive on the refuge with his wife, grand daughter and two toddlers. When confronted with the fact that this type of activity was not allowed under his permit, he explained his gun and required red clothing was in the trunk. He was escorted off the refuge. Future permits are going to be more restrictive.

A muzzleloading season (4-10 December) was started in ND this year. At a project leader's meeting, it was thought that the state unit which includes LNWR would be opened for this specialized hunt. The ND Game and Fish Department closed this unit to muzzleloaders when they received information that deer numbers were low. The permit package distributed to muzzleloaders from the state department showed LNWR open during the season on one slip (showed what NWRs were open to muzzleloaders), and closed on the state proclamation. The State Department was contacted to see If they wanted LNWR open, they said no, they had missed this when the season permits were distributed to the hunters. A guick news

release seemed to be successful, since no one hunted LNWR during the season.

### 11. Wildlife Observation

Lostwood is becoming a birding paradise for those seeking wildlife in general, and true grassland species. Ms. Gwen M. Lorenz wrote a letter requesting Lostwood leaflets be sent to her so she could write to Bill Thomas, author of TALKING WITH THE ANIMALS, and request he add Lostwood to his list of "Prime Wildlife Areas." Mr. Terry Rich wrote an article for inclusion in a birding magazine, about Lostwoods unique grassland species (appendix 10).

The number of bird watchers visiting LNWR is increasing. LNWR must have gotten on some kind of "birder's hot list" because more birders are coming here to specifically see certain grassland species; grasshopper, LeConte's, and Baird's sparrows, and Sprague's pipit. This past year, from mid-May through mid-July, LNWR was receiving about one car of birding people per day. Some were retirees, some young adults, and some were families.

The grouse blind received more use this year than any previous: 17 and 25 April, and 5, 6, and 9 May.

### 17. Law Enforcement

Two citations were written in 1987. One was an untagged deer taken on the refuge, \$50 fine, and the other a trespass entry into the refuge to retreive a snow goose, \$35 fine.

### I. EQUIPMENT & FACILITIES

### 2. Rehabilitation

Boundary fence repair, predominantly rewiring, continued in 1987 with 1.75 miles being completed.

Concrete was poured into the driveway and sidewalks of the residence quarter area, dramatically reducing mud problems, and winter maintenance of the driveway.

The coal furnace was replaced with two gas furnaces (why is explained on page 47). The old coal bin, adjacent to the office, was remodelled to be used as a chemical storage facility, heated from the office furnace by a pipe from the furnace room through the outside wall, into the coal bin (the hole is where the furnace auger pulled coal from the bin).

### 3. Major Maintenance

The shop drain has never functioned properly. Every time a vehicle was washed inside, especially during winter months, water backed up onto the shop floor. It was getting worse each year. This fall, the rock-filled pit (hole under ground) was dug up to determine the cause of the problem. The rock-filled pit was plugged full of water, and oil products from machinery. We called Denver Engineer to determine what was going wrong; they asked if a T-pipe was in place in the oil trap of the shop. Checking this out, we found that the T-pipe was broken off, which allowed everything to enter the pit. The following improvements were made: T-pipe installed, perforated pipe layed from the shop to the new, larger rock-filled pit constructed away from the compacted shop driveway, and a vertical pipe installed from the bottom of the pit to the ground surface so if the pit ever fills, it can be drained without digging everything up.

The domestic water at LNWR is not recommended for use by the ND State Health Department, and has periodic hydrogen sulfide emissions (United States Geological Survey said the source of the sulfide is from a coal vein that lays above the ground water, about 100 feet deep). Two attempts were made to get better water for the refuge and residence in 1987, but each time a hole was punched, a coal vein was hit just prior to the aquifer. USGS was contacted for help. They recommended going down to an aquifer that is about 500 feet deep. They are confident there will be no hydrogen sulfide, and probably less salts and other minerals, like manganese, in the lower aquifer. In 1988, we will be drilling for "oil" or I mean water.

Shelterbelt maintenance continues. An entry way was built in front of the office door to reduce the wave of cold air that entered in the winter months every time the door was opened. The motor in the D-6 cat was replaced.

### 4. Equipment Utilization and Replacement

A new, fiberglass water tank was installed onto the slip-in-unit for prescribed burning. The old tank continually had chunks of rusted metal getting into the pump.

### 7. Energy

The Western Area Power Administration office in CO sent a huge stack of literature about wind generation, and the average wind needed for generators to be cost efficient. LNWR has two years of continuous wind monitoring through the air quality station. The literature has not been locked at yet, nor have the the wind data been analyzed.

### 8. Other

YCCs again helped get a lot of things done: chairs and small tables cleaned, stained and varnished; picnic tables painted; general paint touch-up on the shop; office map and book case painted; office desk refinished; and part of the residence's basement floor painted.

The old patrol cabin, "Kudson Shack," located along the west shore of Upper Lostwood Lake, was removed this fall. John Stewart did an excellent job of demolishing and burying it, and restoring the site.

### J. Other Items

### 1. Cooperative Programs

"Green Surveys" were completed for the state in 1987.

North Dakota State Health Department (NDSHD) and LNWR cooperate on the Ambient Air Quality program. NDSHD provides equipment and analysis, and LNWR, the staff hours for installation of filters. The same state department also requested staff assistance for radiation monitoring. This is done once a month. In addition,  $\rm H_2S$  and  $\rm SO_2$  equipment is now installed on LNWR. NDSHD is analyzing the data.

Two Ducks Unlimited projects were disapproved, North Elbow Impoundment, and Small Impoundment and Restoring Upland Cover, but one was approved, West Rock Slough Water Control Structure. An EA will be written in 1988. Another idea was presented to them which they received favorably, was reseeding of old, decadent cropland to native grass cover on Class IV lands. This will be written up and submitted to RO for approval in 1988.

Ross Pywell (National Wetlands Inventory) and Louis Cowardin visited LNWR to begin entering Lostwood mapping data into a computer program, on an experimental bases. Our vegetative mapping was used to help them identify land features.

Al Ludden, Ecological Services, Bismarck, visited LNWR on 24 June to begin planning for money to continue water quality work on LNWR. The money fell through the cracks and went elsewhere, but, Denver RO came through and provided the needed funds.

The Elbow Lake boundary along the township road school bus route was moved to prevent snowdrifts from crossing the road.

### 3. Items of Interest

Karen attended the Prairie Grouse Conference in Crookston, MN on 15-18 September. A brief summary of sharp-tail grouse response to prescribed burning was presented.

Radon measurements were taken in the basement and upstairs of the residence house. The readings were 6 and 4 respectively.

A matted waterfowl print by the manager was donated to the Bowbell's DU banquet in March. It sold for \$115.00, which is a lot for northwestern North Dakota farmers.

In 1980, a project for the ND Chapter of the Wildlife Society was begun by Smith as a fund raiser (and also to give time to the Chapter because distance from main activities prohibits giving time for other Chapter activities). Each year, an original India Ink Scratchboard drawing is donated to the Chapter, depicting a different species of waterfowl that reproduces on LNWR, conveying biological facts or a behavior observed by Smith while completing work on LNWR. There are twelve species that nest on LNWR, nine drawings have been completed. The drawings have brought the Chapter about \$2640 from 1980 to 1987. There are three species left to draw. The list of species completed to date and their titles, and species left to go are:

1980 - Canvasback "Beginning Search" (original was not auctioned at

the Chapter meeting, but print #1 was)

1981 - Canada Geese "Peaceful Rest"

1982 - Lesser Scaup "Unsettled Dispute"

1983 - Pintail "Afternoon Replenishment"

1984 - Blue-winged Teal "She's Mine"

1985 - Wigeon "Territory Secured"

1986 - Mallard "Foiled Rape"

1987 - Redhead "Choose Me"

1988 - Green-winged Teal "Teal Jazz"

The remaining three are: shoveler, ruddy duck, and gadwall.

### 4. Credits

Del Pierce wrote sections E1, and E5; and Tedd Gutzke completed E6. The remainder of the narrative was completed by Karen Smith, except for Robert Murphy's work on the raptor study (he also edited the rough draft). Final editing was done by Gutzke, the original narrative copy was printed on an Apple IIe computer, owned by Karen and R. Murphy. The narrative copies and assembly was done by Molly Hansen and Doris Huwe.

### K. FEEDBACK

I am beginning to sense a change in the philosophy of resource management in North Dakota. It seems that good, quality biology is considered second seat to bio-politics, and realty. There even seems to be some in ND that think biology really is not all that important, especially compared to political activity. If we put all our talents into one area, we will lose out. We have to be diversified in all areas of resource expertise, and be good at each. Realty, bio-politics, and other resource aspects obviously are essential in maintaining and improving ND resources. But so also is acquiring biological facts, for without the base — sound biological facts — we have nothing to stand on

for realty decisions and bio-politics to fight or intelligently compromise with. We need to recognize <u>all</u> individuals in the field including biologists, who seemed to be the underdog in ND and perhaps Region 6 (some other Regions, like Region 1 and Alaska hire, recognize, and pay their biologists — as biologists!) Today refuge bioloists are basically management research biologists. They must obtain resource information needed to successfully manage not only federal lands, but also resources on private lands. It takes a team effort from all specialists, equal in pay and recognition, in order for the compromise approach of resource management to win in ND.



### United States Department of the Interior

FISH AND WILDLIFE SERVICE
DES LACS NATIONAL WILDLIFE REFUGE COMPLEX OFFICE
KENMARE, NORTH DAKOTA 38746
REFUGES: DES LACS, LOSTWOOD, LAKE ILO
WETLAND DISTRICTS: CROSBY, LOSTWOOD



February 17, 1987

Nancy Sather Research Assistant Midwest Regional Office 1313 Fifth Street SE Minneapolis, MN 55414

Dear Ms. Sather:

I have some bad news and some good news about the exotic species you are inquiring about for control with prescribed burning. I will go through your list by species. Most of the information I have is observation, however, Arnie Kruse, Northern Prairie Wildlife Research Center, has information that will be published in a couple of years (it is only a six year study). Also, our first few years of burning was targeted for reducing woody plants, such as Symphoricarpos, and not to maximize exotic grass reduction.

<u>Cirsium arvense</u> is quite common on areas that have not been burned for many years. We predominantly burn in mid-June and late July to mid-August (to reduce a native woody shrub). Canada thistle in sod has been very effectively reduced and in some cases eliminated with prescribed burning. After a June burn, the thistle goes wild with seed production, but the next year, very little thistle is present (why, is unknown). After a summer burn, thistles grow the "ground leaves" but are frozen before development progesses much further. The next year, very few thistles are present. After two or three more burns, few thistle plants can be observed (this is documented by the NPWRC study.)

Euphorbia esula is not very common on LNWR. There are about 16 acres on the 27,000-acre refuge. We are eradicating it from known locations using burning and Picloram. The burning really "turn on" spurge. I believe that the burning does two things; 1) burns up or scarifies the seeds laying in the litter (it takes three or four burns to finally get through all the litter where the seeds are laying) forcing the scarified seeds to germinate, and 2) removes the litter and other cover over the spurge plants so that when the chemical treatments are applied in June and September, all plants are reached including the many, many tiny seedlings that can go to seed unnoticed. Getting rid of the seeds laying dormant in the litter, preventing any plant from going to seed, and chemically weakening the parent plants are the keys to eradication.

Artemisia absinthium is also not very common on LNWR. We have not been chemically treating it, and I have not noticed it on prescribed burn areas (about 30% of LNWR has been burned) so I cannot say how it responds.

Bromis inermis is very common on LNWR, unfortunately. Many of the old cropland fields were seeded to brome in the late 50's. Native grasses have been weakened by allowing heavy litter to accumulate and remain over many years which has created ideal conditions for brome to spread. Burning to date (an intensive prescribed burning program began in 1978 on LNWR) has not effectively reduced brome but instead has increased it on areas that were decadent from heavy mats of litter or thick stands of Symphoricarpos. After nine years and four prescribed burns on a 12-acre plot, brome and quack grass (Agropyron repens) are competing with big bluestem (Andropogon gerardi), and surprisingly, big bluestem is very slowly spreading into the exotics. I believe that in order to continue this trend, future burning must continue (May burns included) and possibly May grazing (the early spring grazing provides continuous pressure on the exotics, then when the natives begin to grow in late May, cattle are removed and the native cool seasons can grow with little competition from exotics) in order to significantly reduce brome.

Poa compressa and P. pratensis are both common on LNWR, but Kentucky is very common. Kentucky has spread easily with the heavy litter that was allowed to accumulate. Fire has not caused a dramatic change on Kentucky when compared to idle areas, however there appears to be a slow trend to more Agropyron smithii and other native grasses where Kentucky is present. However, this is not as evident as with brome and bluestem. Again, it is going to take many years of repetition fire (on some ND refuges, May burning has shown very gradual reduction of exotic grasses over several years) and possibly early spring grazing to reduce the competition of the earlier germinating exotics. Canada seems to be holding its own, but I am seeing Stipas and western spreading into the areas dominated by Canada.

I guess what I am saying on the perennial exotic grasses is that three or four burns will not effectively reduce these plants, but it allows the natives to spread and with continuous pressure, the spreading may increase. It is going to take more than nine years to see the ultimate results. My intent is not to discourage you from burning, but to let you know that the results take time, lots of time. I believe repetition treatments will get us where we want to be but to prove it scientifically will take 20-30 years. Leo Kirsch, retired NPWRC personnel at the Woodworth station, has been studying the effects of repetition fire over 20 years and he concurs with my statement, in fact, he probably said it.

<u>Populus tremuloides</u> with burning in June and July and August can be held in place, but it is a fire adapted species and survives well by sprouting, as I am sure you are aware. We have slowed the spreading of our clones, but if we would burn and cut the sprouts before the root reserves were replenished, reduction could be possible. We are not making a conscious effort to do so.

To my knowledge, Carduus nutans and Phalaris arundinacea are not found on LNWR.

Our burning regime consists of burning every other year (if we had enough moisture to get enough growth each year, I would burn annually) for five years. Let rest a couple of years and burn twice in the next four years. My philosophy has been to get as many burns in in the first three or four years as I possibly could. This was to put stress pressure on woody plants and exotic grasses (exotics thrive best in heavy litter).

I hope this has been of some help. Bonnie was on LNWR and I gave her a tour. She saw some of the gradual changes taking place and got excited, like I do. But I want to leave you with the impression that it is going to take lots of time and devotion to the cause to reach our (yours and mine) objectives.

Good luck!

Sincerely,

Karen Smith Refuge Manager

KS/dh cc/Arnie Kruse

## The Nature Conservancy

1800 North Kent Street, Arlington, Virginia 22209 (703) 841-5300

### ELEMENT STEWARDSHIP ABSTRACTS

To the User:

Element Stewardship Abstracts (ESA's) are prepared to provide The Nature Conservancy's Stewardship staff and other land managers with current management related information on those species and communities that are most important to protect, or most important to control. The abstracts organize and summarize data from numerous sources including literature and researchers and managers actively working with the species or community.

We hope, by providing this abstract free of charge, to encourage users to contribute their information to the abstracts. This sharing of information will benefit all land managers by ensuring the availability of an abstract that contains up-to-date information on management techniques and knowledgeable contacts. Contributors of information will be acknowledged within the abstract and receive updated editions.

For ease of update and retrievability, the abstracts are stored on computer at the national office of The Nature Conservancy. Each abstract has a Nature Conservancy office or program responsible for its updating and maintenance. The address and telephone number of the office is recorded on the first page of the abstract. Anyone with comments, questions, or information on current or past monitoring, research, or management programs for the species or community described in an abstract should contact the Land Steward in the office responsible for that abstract.

This abstract is a compilation of available information and is not an endorsement of particular practices or products.

Please do not remove this cover statement from the attached abstract.



# U.S. FISH AND WILDLIFE SERVICE region &

March 19, 1987

Refer: Des Lacs Refuge Complex

701/385-4046

FOR IMMEDIATE RELEASE

SPRING GRAZING AVAILABLE

Does your pasture need a spring rest to allow a good growth for summer and fall grazing? There are two pastures on Lostwood National Wildlife Refuge available for 1987 spring grazing, according to Refuge Manager Karen Smith. Smith says the two pastures are 115 and 50 acres in size and were both burned in 1985. They will be grazed at one acre per AUM from May 1 to 31, 1987. In order to qualify for applying, you must be a North Dakota resident, own at least ten cattle six weeks old, be at least 18 years old or head of a household, and live within a ten mile radius of Lostwood Refuge. Applications and more information are available by writing to Tedd Gutzke, Des Lacs National Wildlife Refuge, Box 578, Kenmare, ND 58746, or calling 385-4046. Applications must be postmarked by April 8, 1987. The lottery (drawing) will be held at 9:00 am on April 10, 1987.



## United States Department of the Interior FISH AND WILDLIFE SERVICE

APPENDIX 4

IN REPLY REFER TO:

RW AIR QUALITY MAIL STOP 60130

STREET LOCATION: 134 Union Blvd. Lakewood, Colorado 80228

### DEC 29 1987

Memorandum

From:

To: Refuge Manager, Lostwood National Wildlife Refuge

MAILING ADDRESS:

Post Office Box 25486

Denver Federal Center Denver, Colorado 80225

Wildlife Biologist, Denver Air Quality Staff

Subject: Interpretation of 1986 - 1987 Sulfur Dioxide and Hydrogen Sulfide

Data

You requested the assistance of the Denver Air Quality Staff to evaluate and interpret the 1986 and first three quarters of 1987 sulfur dioxide ( $\mathrm{SO}_2$ ) and hydrogen sulfide ( $\mathrm{H}_2\mathrm{S}$ ) air quality monitoring data collected at Lostwood National Wildlife Refuge. Based on additional information you have provided and numerous telephone conversations with you, we offer the following comments concerning the 1986 - 1987  $\mathrm{SO}_2$  and  $\mathrm{H}_2\mathrm{S}$  data. We have also provided you with some recommendations for future air quality monitoring.

The data is reported by the State of North Dakota on a quarterly basis and consist of four different parameters: (1) pollutant concentration in parts per billion (ppb) (2) time of day the pollutant is recorded (3) wind direction (compass reading) and (4) wind speed (m.p.h.). The minimum detectable level for both  $SO_2$  and  $H_2S$  is 5 ppb. Values above the minimum detectable level are recorded as hourly averages. To adequately interpret the data one must look at (1) the pollutant concentration value in parts per million (ppm) or micrograms per cubic meter (ug/m³), (2) the duration (time period) of the concentration value and (3) the resources most likely to be impacted (bioindicator species) by the pollutant.

Concerning the 1986 SO<sub>2</sub> data: On an overall basis the SO<sub>2</sub> concentration values were low ranging from 5 ppb (0.005 ppm) - 86 ppb (0.086 ppm). The high value of 86 ppb occurred on January 23, at 4:00 a.m. and rapidly decreased within 2 hours. This is typical of SO<sub>2</sub> concentrations. The wind direction at 4:00 a.m. on January 23, was from the southeast (138°) and the pollution source was most likely the coal burning furnace at the Refuge office. There were many days in which the maximum value was 5 ppb, the detection limit of the instrument. Our analysis concentrated on only those days in which there were multiple occurrences of values greater than the detection limit within a 24 hour period rather than on single hourly readings. There were 33 days throughout the year that met this criteria and these occurred mostly during the winter months (October - February). An analysis of wind directions

associated with measureable concentrations shows that measureable SO2 occurs with winds from the northwest 55% of the time (probable source being the coalfired power plant in Estevan, Canada), from the southwest 21% of the time, from the southeast 15% of the time and from the south 9% of the time. To be more realistic, and to put the maximum observed concentration (86 ppb) in perspective, we can compare it to the primary and secondary National Ambient Air Quality Standards. There are two primary SO2 standards (1) 0.03 ppm is . the annual arithmetic mean (not to be exceeded) and (2) 0.14 ppm (maximum 24hour concentration not to be exceeded more than once per year) were established to protect the public health. The secondary standard of 0.5 ppm (maximum 3-hour concentration not to be exceeded more than once per year) was established to protect the public welfare from any known or anticipated adverse effects of a pollutant. As you can see, the highest value recorded is well below the National Ambient Air Quality Standards. However, research has shown that foliar injury to vegetation can occur below the primary standard of 0.03 ppm (annual arithmetic mean). The key factors to foliar injury are the magnitude and duration of exposure to air pollutants, neither of which is a factor of concern when we look at the 1986 SO2 data.

For future reference we should also look at the potential SO2 impact to the air quality related values (flora and fauna) of the refuge. Certain species of vegetation serve as good bioindicator species of air pollution. Review of the vascular vegetative species list of the refuge reveals the following species to be sensitive to acute (0.5 ppm and 1.0 ppm for 4 to 7 hours) SO2 exposure: Amelanchier alnifolia (Saskatoon serviceberry), Cornus stolonifera (Red osier Dogwood), Prunus virginiana (choke cherry), Rosa spp (wild rose), Salix spp (willow), Rhus radicans (poison ivy), Symphoricarpos albus (snowberry) and Populus tremuloides (quaking aspen). Non-vascular plants (lichens, mosses) generally are much more sensitive to air pollutants than vascular plants and can also serve as good bioindicator species of air pollutants. One lichen species (Cladonia fimbriata) is damaged or killed by low-level, chronic exposure to SO<sub>2</sub> as low as 13 ug/m<sup>3</sup> (annual average). Lostwood Refuge does not have a lichen species list however; Theodore Roosevelt National Park, located in western North Dakota, contains 208 species of lichens (including Cladonia fimbriata) of which 3 are considered sensitive and 7 are considered sensitive to intermediately sensitive to SO2. A comprehensive lichen list for the refuge may provide bioindicator species that prove to be more sensitive to lower SO2 concentration values than the vascular species listed above.

Concerning 1987 SO<sub>2</sub> Data: Once again we looked at the range of pollutant concentration values measured during the first three quarters of 1987. The range of values was 5 ppb to 73 ppb. The high value occurred on September 9, at 4:00 a.m. and decreased to 24 ppb within one hour. The high concentration value of 73 ppb (0.073 ppm) was short lived and considered too low to cause damage to the most sensitive bioindicator plant or animal species. During the first 9 months of the year 38% of the measureable SO<sub>2</sub> was recorded from the southwest, 31% from the southeast, 23% from the northwest and 8% from the south.

Concerning the 1986 H<sub>2</sub>S Data: Hydrogen sulfide is a highly toxic gas that is formed by the decomposition of organic matter containing sulfur. In North

Dakota,  $H_2S$  is also commonly found within certain oil fields in the western portion of the state. The gas is released from underground formations during oil production and storage operations. The most common practice within the oil production process is to burn or "flare" the  $H_2S$  thus converting it to  $SO_2$ .

The first measurable concentrations were recorded on June 10 and 11 with the highest value (25 ppb) recorded on June 26 and 27. All values were recorded during the months of June, July and August between 11:00 p.m. and 5:00 a.m., with low to moderate southwesterly winds. There was only one exception to this pattern when the wind was blowing from the northeast on July 16 and the values (6-17 ppb) were recorded between 3:30 a.m. and 11:30 a.m. During the course of several telephone conversations with you and with the help of additional refuge habitat information we have learned that certain wetland areas close to the monitoring station were dry or nearly dry during late July and August. We have concluded, as you have, that the low level H2S readings during the summer months of 1986 were naturally occurring and were being produced by the decomposition of organic material within these wetlands as they became dry. The range of concentration values (6-25 ppb) were extremely low, were short lived and pose no threat to the welfare of humans or air quality related values (flora or fauna) of the refuge.

Concerning the 1987 H<sub>2</sub>S Data: The 1987 H<sub>2</sub>S data showed almost the identical pattern as the 1986 data supporting our conclusions that the low level concentrations (6-63 ppb) are naturally occurring, short lived and pose no threat to human health or the welfare of Lostwood's natural resources. The earliest measureable concentrations were recorded in May (3 days) with June, July and August having the most measureable concentrations. The basic pattern was once again low to moderate winds (0-15 mph) coming from the southwest (75% of the time) during the early morning hours.

### Conclusions and Recommendations:

Based on our interpretation and analysis of the 1986-87 ambient air quality data for sulfur dioxide and hydrogen sulfide we would not expect these low level concentration values to adversely impact the air quality related values (flora and fauna) of Lostwood National Wildlife Refuge. However, if the annual average  $SO_2$  concentration value reaches 0.005 ppm  $(13 \text{ ug/m}^3)$ , a low-level chronic concentration at which one species of lichens is damaged, we would be more concerned of potential impact to the flora and fauna of the refuge.

We make the following recommendations: (1) continue to monitor for  $SO_2$  and  $H_2S$  at the refuge for an additional 1 to 3 years, provided the State of North Dakota is willing to help and/or Service support is available, (a minimum of three years of data is usually necessary to obtain good baseline information); (2) At the end of the 3 to 5 year monitoring period we should consider moving the ambient air monitoring equipment to another Refuge within Region 6 to begin gathering baseline data at a site with potential air pollution problems; and (3) compile a floristic lichen species list in order to identify the most sensitive bioindicator species (flora) on the refuge.

If you have any questions concerning the interpretation and/or analyses please give me a call at (303) 969-2072 or FTS 327-2072.

Prairie Nat. 19(4):262. 1987.

OBSERVATIONS OF THE WOOD FROG IN NORTHWESTERN NORTH DAKOTA—Wheeler and Wheeler (1966, The amphibians and reptiles of North Dakota, University of North Dakota Press, Grand Forks) state: "In North Dakota, the wood frog (*Rana sylvatica*) is found in only the eastern half of the state." Also, the wood frog is not mentioned in a recent list of northwestern North Dakota vertebrates (Steinhaus, 1979, A list of vertebrates of northwestern North Dakota, Univ. N. D. Inst. Ecol. Stud. Spec. Publ. No. 6.). Here, I report on the occurrence of wood frogs in northwestern North Dakota.

At 2130 hr on 15 April 1984 (5°C, clear, calm), I observed at least three male wood frogs calling from a 0.1-ha semipermanent, freshwater wetland near Bowbells, Burke County, North Dakota. I did not attempt to capture the frogs but verified their presence by comparing their call notes with those on a documented, taped recording (Anderson and Jansen, 1980, Wisconsin Anuran calls, University of Wisconsin-Stevens Point, Stevens Point, WI (cassette tape)). When I returned to this site in spring 1985, little water remained in the marsh

and no frogs were heard.

At 1800 hr on 8 April 1986 (15°C, clear, calm), I heard wood frogs calling among chorus frogs (*Pseudacris triseriata*) at the northeast boundary of Lostwood National Wildlife Refuge (LNWR), about 17 km southwest of Bowbells. Here, I searched a 3.5-km² area and observed 1-8 ( $\bar{x}=3$ ) wood frogs calling in each of 12 wetlands (fresh seasonal and semipermanent, most smaller than 1 ha). Wetlands were surrounded by native grassland, tame hayland, and cropland and most were bordered by 0.1-0.8-ha ( $\bar{x}=0.4$ ) clumps of quaking aspen (*Populus tremuloides*). During the following two weeks, I searched 250 km² south and west of this area and commonly heard chorus frogs and, occasionally, leopard frogs (*Rana pipiens*), but never heard wood frogs. I searched this area again during April 1987 and found wood frogs calling 3.0 km south to 2.2 km west of where I observed them in 1986. On 14 April 1987 I collected three specimens at the northeast corner of LNWR and later deposited them, respectively, in collections at LNWR, the Department of Biology, University of North Dakota, and the Department of Zoology, North Dakota State University.

These observations occurred about 140 km west of the closest record in Wheeler and Wheeler (1966), and about 40 km south of that reported by Cook (1966, A guide to the amphibians and reptiles of Saskatchewan, Sask. Mus. Nat. Hist. Popular Ser. No. 13.) for Saskatchewan. Wood frogs may be more widespread in North Dakota than noted by Wheeler and Wheeler (1966), or their range may be expanding. Biologists should be aware of these possibilities and the need to further document the wood frog's distribution in northwestern

North Dakota.

I thank J. W. Grier, M. G. McKenna, R. W. Seabloom, G. C. Wheeler, J. Wheeler, and W. J. Wrenn for reviewing drafts of the manuscript.—Robert K. Murphy, Lostwood National Wildlife Refuge, RR 2, Box 98, Kenmare, ND 58746.

Received 15 September 1987. Accepted 2 November 1987.

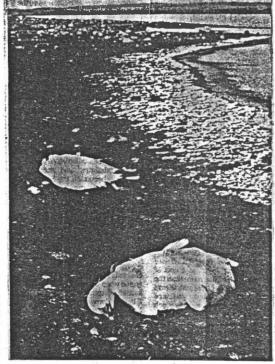
## Eagles frighten Snow Geese Burk Co-Tribune

(Part I of a three part series on eagles in our lives)

By Karen Smith and Robert Murphy

What a wonderful fall it has been, with warm temperatures and light winds! Associated with the unseasonably mild November was a build-up of snow geese in western North Dakota, On Lostwood National Wildlife Refuge, up to 30,000 snow geese were using the 220-acre Thompson Lake, just north of refuge headquarters. Lostwood Refuge has never witnessed such large number of snow geese.

Thompson Lake did, at times, appear over half white with snow, but of course the "snow" was geese. The chorus of sounds made by so many birds is variable, vet constant. During take off, landing, or while merely resting along the shoreline, "snows" emit different sounds for different activities. Often times when the birds are resting peacefully along the shoreline, a portion of the flock will give alarm calls and, sequentially, individual birds will rise in a synchropous wave until the entire shoreline is cleared of geese. Sometimes the flock is startled by a predator, such as a coyote, fox, or raccoon that is searching the shoreline for crippled birds or carcasses. Also, raptors (birds of prey), especially eagles, may test the flock for weak or valnerable birds, or may soar overhead or perch nearby, in search of dead birds. Several bald and golden eagles, both adults and immatures, may be associated with the large flocks of snow geese; several eagles were on Lostwood Refuge this fall.



Some hunter killed snow geese along the shoreline of Thompson Lake. Lostwood National Wildlife Refuge.

As an eagle flies over the resting flock of geese, the frightened flock rises off the water or shoreline, flying in frantic ribbons of white, eventually settling down on another section of the lake. Healthy birds usually out maneuver the eagles, but weak or crippled geese, mainly those wounded by goose hunters, are sought by eagles. Herein lies a problem: a goose wounded by hunters has lead pellets in its body. and an eagle ingests the lead pellets while feeding on the goose. Eagles, like other raptors, have strong digestive acids in their stomachs that are capable of breaking down lead pellets. The lead is absorbed in the bloodstream and accumulates in the body, eventually reaching levels that kill the eagle. Eagles may succumb directly to lead poisoning as such, or they may become so weak that they die from other causes. Lead poisoning has been documented as the cause of death in over 70 bald eagles in recent years.

By 1989, hunters of ducks and geese (also cranes, coots and snipe) in North Dakota can hunt only with steel shot. This will be a blessing for eagles and other raptors that feed on wounded ducks and geese. Our national symbol, the bald eagle, will continue to feed on geese, but will live to breed in subsequent years. Take pride in our nation's steps to protect our national symbol and other birds. Steel shot will protect our eagles!

(For additional information, please contact Karen Smith and Robert Murphy at Lostwood National Wildlife Refuge, RR 2 Box 98. Kenmare, ND 58746 or 848-2722.

## Lead Shot In Geese Romoter **Can Poison Bald Eagles**

By Karen Smith and Robert Murphy

What a wonderful fall it has been, with warm temperatures and light winds! Associated with the unseasonably mild November was a build-up of snow geese in western North Dakota.

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Thompson Lake did, at times, appear over half white with snow, but of course the "snow" was geese. The chorus sounds made by so many birds is variable, yet constant.

During take off, landing, or while merely resting along the shoreline, "snows" emit different sounds for different activities.

Often times when the birds are resting peacefully along the shoreline, a portion of the flock will give alarm calls and, sequentially, Lake Lostwood National Wildlife individual birds will rise in a Refuge. synchronous wave until the entire shoreline is cleared of geese.

Sometimes the flock is startled by a predator, such as a coyote, fox, or raccoon that is searching the shoreline for crippled birds or carcasses.

Also, raptors (birds of prey), especially eagles, may test the flock for weak or vulnerable birds, or may soar overhead or perch nearby, in search of dead birds.

Several bald and golden eagles, both adults and immatures, may be associated with the large flocks of snow geese; several eagles were on Lostwood Refuge this fall.

As an eagle flies over the resting flock of geese, the frightened flock rises off the water or shoreline, flying in frantic ribbons of white. eventually settling down on another section of the lake.

Healthy birds usually out maneuver the eagles, but weak or crippled geese, mainly those wounded by goose hunters, are sought by eagles.

Herein lies a problem: a goose wounded by hunters had LEAD pellets in its body, and an eagle in-



Some hunter killed snow geest along the shoreline of Thompson

gests the lead pellets while feeding on the goose.

Eagles, like other raptors, have strong digestive acids in their stomachs that are capable of break ing down lead pellets.

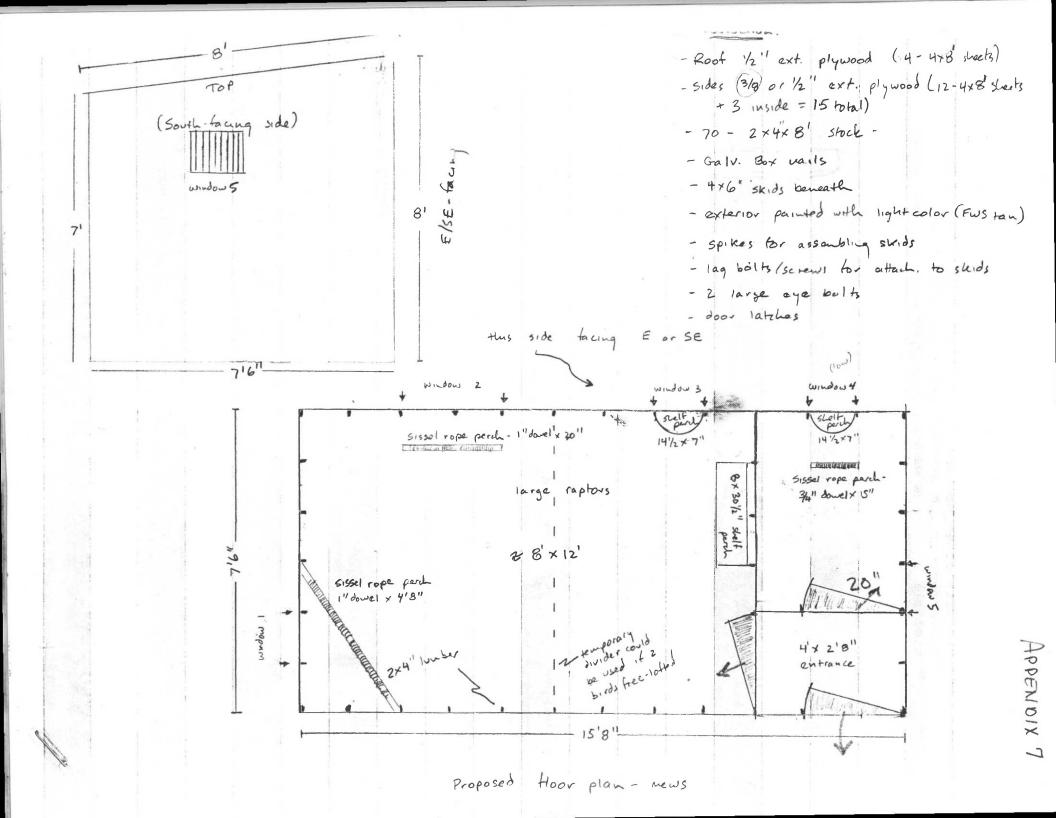
The lead is absorbed in the bloodstream and accumulates in the body, eventually reaching levels tha kill the eagle.

Eagles may succumb directly to lead poisoning as such, or they may become so weak that they die from other causes. Lead poisoning ha been documented as the cause of death in over 70 bald eagles in recent years.

By 1989, hunters of ducks and geese (also cranes, coots, and snipe in North Dakota can hunt only witl steel shot. This will be a blessing for eagles and other raptors tha feed on wounded ducks and geese.

Our national symbol, the bale eagle, will cominue to feed on geesc but will live to breed in subsequen vears.

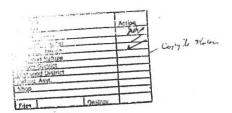
Take pride in our nation's step to protect our national symbol and other birds. Steel shot will protec our eagles!



NOV

DES 18 November, 1987

Delano Pierce, Project Leader Des Lacs National Wildlife Refuge Complex Kenmare, North Dakota 58746 Re: Permit Number DL-04-87



Dear Del:

In accordance with permit guidelines, I am writing to inform you that I did not actually collect insects this year on FWS land in your jurisdiction. I did, however, collect on several occasions near enough to the Lostwood Refuge that the following information will be of interest to you:

Approximately two miles east of Powers Lake, on the highway right-of-way to the south, on May 24 I took four fresh specimens of the Rustic Blue, Agriades rusticus (=franklinii; = Plebejus aquilo; = P. glandon). This is a state record for the species. On the 29th of May, I took two more males in the same locale. Since this is only a few miles west of the Lostwood Refuge, you may be interested in this record. The only other records for the species in the lower 48 east of the Rockies are in the Black Hills. The larval food for North Dakota is unknown. In the arctic and alpine regions, it feeds on Pygmyflower (Primulaceae), but Saxifrages and Legumes are also on record, and I suspect legumes, given the flora in the pasture. You may wish to reconsider your management plans for legume-rich prairie sections of the refuge until we figure out just how common this beast is.

In the same locality, I found the following species at various times during mid to late May:

Glaucopsyche lygdamus (ssp. oro) -- abundant, Burke county record, May 24 Plebejus saepiolus -- two specimens, Burke county record, May 24 Vanessa cardui -- (common seasonal immigrant), Burke Co. record, May 29 Charidryas gorgone -- one female, 29 May Oeneis uhleri varuna -- one worn female, 29 June, Burke county record

In the same area on the 13th of June, I found *Speyeria callippe calgariana* abundant in the alfalfa by the roadside. This is rather early for *callippe*, which normally emerges later in June and flies throughout July.

I also did make several sight records during a family picnic outing in the Des Lacs Refuge, 24 May:

Colias eurytheme and philodice -- common, Burke county record, 24 May Coenonympha inornata -- common, Burke county record, 24 May Charidryas gorgone -- one fresh female, Burke county record, 24 May Glaucopsyche lygdamus -- one Lycaeides melissa -- one, Burke county record, 24 May Everes amyntula -- one, Burke county record, 24 May

A few miles east of highway 8 in the north-side right-of-way off Hwy 50, I took the first Burke County specimens of *Epidemia helloides* (the Purplish Copper). This is another insect that I would expect is common in the refuges, since it is a creature of wet ground -- feeds on *Rumex*, *Polygonum*, etc., in Polygonaceae.

That, I think, is about all that relates to your neck o' the woods. You may be interested to know that I did discover two relatively vast colonies of the Dakota Skipper (Hesperia dacotae), one in eastern MacKenzie County, and another in Dunn County. These are to my knowledge the first records of Hesperia dacotae from the badlands, and also from west of the Missouri in this state. The combined acreage of these two colonies probably exceeds all the rest of the known habitat in the state!

I look forward to the possibility of again collecting in the Burke County area next year, and especially to extending our knowledge about the state's newest resident butterfly.

Thanks for all your willing support of our work.

With every good wish,

Ron Royer

## Grassland tour set for Aug. 22

Are you interested in results from prescribed burning over the last nine years? Would you like to ask lots of questions, such as "Why do you burn?" or "How do you burn?" On August 22, 1987 you can ask these questions and more of Karen Smith, refuge manager of Lostwood National Wildlife Refuge, because the fourth annual bus and horseback tour will occur on that date. A school bus will leave from the refuge headquarters at 9:00 a.m. for a tour that will last about 2 hours and a horseback tour will leave from refuge headquarters at 4:30 p.m. that will last 3 to 4 hours (bring your own horse). We will be looking at areas that have had no burns since the early 1900's, to areas that have had as many as 3 burns since 1979. Other things we will look at are a 1986 native grass seeding and discuss seeding of native grasses, response of an old alfalfa field to 4 prescribed burns, wildlife as it appears, monitoring of air quality, and whatever else others might want to see.

Karen and her husband will provide rolls and beverages after the bus tour, and barbecued sandwiches and beverages after the horseback tour. If you have time during the busy harvest season, please come out and visit with us and discuss those things that you have always wanted to discuss. We would enjoy having you visit!

# Land of LGB's

These sparrows are the principals in a rich prairie symphony.

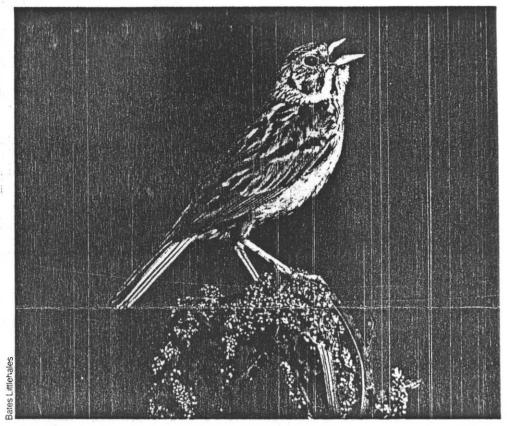
by Terry Rich

hat would it take to get a group of people really excited about going to North Dakota to look at prairie sparrows? You're probably thinking that enormous bribes would help. And what would it take to get a group of birders impassioned about such a trip? Anyone who keeps a life list can probably think of a few species of the northern prairies they'd like to see, but they would likely start packing their bags more quickly if Elegant Trogons or Great Kiskadees were on the agenda.

I can't blame them. People have always responded this way to the thought of pursuing small, "colorless" species—birds so bland they've been lumped under the convenient label, LGB's—Little Gray Birds.

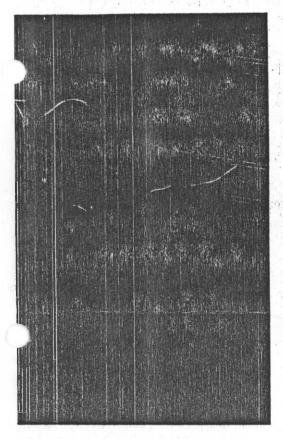
I suppose having "LGB" in our vocabulary provides some relief from the troublesome and potentially embarrassing predicament of having to identify obscure species. It's something like calling out "Empidonax!" for each small, greenish flycatcher. Empidonax has a nice, scientific ring to it - it narrows the number of possible species to a handful and is technically quite acceptable. LGB, however, is an unfortunate epithet that does not pretend to lessen the taxonomic possibilities beyond the obvious — we know it's not a Snowy Egret.

I suppose this slandering of the fringillidae (the major family contributing to LGB's) is a predictable product of Americans' love of the



The Baird's Sparrow (above) is one of the least known sparrows of North America, probably because of its restricted breeding range, centered in North Dakota and South Central Canada. The striking LeConte's Sparrow (below) is another species not well-known by birders. Its breeding range centers in Canada but includes the Northern states from the Great Plains to the Great Lakes.





lifestyles of the rich and famous. Subtlety is a quality that often gets overlooked in favor of color, size and volume. Now, I like Scarlet Macaws and Bald Eagles as much as anybody, but their field marks are so ... so blatant.

Just check out some of the field marks of North American sparrows: the color of the feathers near the base of the bill (lores), fine streaking on the breast or sides, the presence and color of the median stripe on the crown, the length and color of the tail, and the color of the cheek patch. These distinctions make for understated, artful birding—classy stuff.

In graduate school I studied the behavior of one particular LGB that caught my eye in the fragrant sagebrush steppe of southern Idahothe Sage Sparrow. After learning something about its behavior, I began giving talks to local Audubon societies and other wildlife groups.

Before long it dawned on me that most of my fellow students were studying and talking about more "interesting" species—Golden Eagles, Great Blue Herons and Blackbilled Magpies. I slowly realized that Sage Sparrows were not my ticket to Hollywood. Fortunately a good friend, who often traveled to the same meetings with me, was working on Brown-headed Cowbirds. Surely, I thought, people could see that the Cowbird was more lowly even than the Sage Sparrow.

Some years have passed since those early forays into my P.R. campaign for LGB's. Since then I have continued to seek out and enjoy the less spectacular birds of North America. Perhaps it has something to do with the challenges presented by the smaller, more secretive species. After all, no one will discover a new species of eagle in the United States, or anywhere in the world. But new species of small birds have occasionally been ferreted out in remote areas of the world. I'm reminded of this mystery with each skulking sparrow, each cryptic fall warbler. This is the fun.

I recently moved to North Dakota-a state with fewer expectancies for most people than other states. Soon after I arrived, I was asked to conduct several Breeding Bird Surveys-long-term trend studies organized by the U.S. Fish and Wildlife Service. After briefly studying the route maps, I realized I'd have to brush up on my grassland sparrow songs.

One night I was contemplating the differences among the buzzing songs of Grasshopper, Savannah, Baird's, Clay-colored and LeConte's Sparrows with a raptor-enthusiast friend. After listening to the first round of these songs he pronounced, "I told you they're all the same species. It's those blasted LGB taxonomists. They got so bored looking at sparrows they invented a bunch of fake species!"

Of course, I didn't expect any particular appreciation of the subtlety of song variation from a macho falcon fancier. Naturally, it didn't take me more than two (well, maybe four or five) listenings to detect the delicate differences in these wonderful

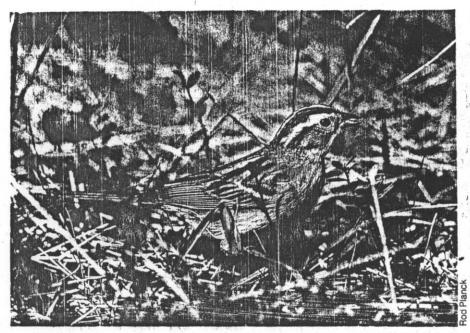
North Dakota is loaded with LGB's. Some may say it's appropriate that a state vaguely thought of as flat should boast a number of species vaguely known as Little Gray Birds. Birders readily appreciate the value of North Dakota's wetlands for the millions of waterfowl that breed there. But for sparrow enthusiasts the place is also a gold mine.

 On a fine June morning last year, 1 found myself standing on the edge of a small, wet meadow in the native prairie splendor of the Lostwood National Wildlife Refuge. I had gone tosee a remnant of the Great Plains and to see one of the prairie specialties— LeConte's Sparrow. Now, a halfway serious birder in search of a lifer can be very single-minded. But it was hard to concentrate on anything in particular in the midst of that rare prairie relic, rolling off in all directions.

Standing in the fairyland of North Dakota past, I finally managed to focus my attention from the powerful visual presence to the equally rich acoustic one. I took a deep breath and began to listen carefully. My strategy was simple—stand still and pick out a LeConte's Sparrow from the other buzzing LGB's and other new-to-me sounds that might emerge.

I first isolated a number of Claycolored Sparrows hiding happily in the over-abundant western snowberry that covered many of the slopes. (Yes, there are slopes in North Dakota.) I felt certain about this species, having cornered a number of Brewer's Sparrows with my parabolic microphone in earlier years. Clay-coloreds and Brewer's have a lot in common, including the pattern of their more common trills. The plumage of these species places them near the epitome of LGB-dom and would surely make a Lark Sparrow feel garish.

Having pigeon-holed the Clays'



The brown ear patches, set off by white stripes, a grayish hind neck, and a grayish-buff crownstripe, are aids in identifying the Clay-colored Sparrow (above). Its monotone "buzz-buzz" is an excellent means for identification. Straddling a tattered flower stalk of Queen Anne's lace, the Savannah Sparrow (below) is a familiar bird to many and one of the earliest spring migrants. The characteristic yellowish stripe above the eye varies in intensity among the different populations.



low, summary "buzz buzz," I mentally moved to the next offering—Savannah Sparrows. To my mind Savannahs are less distinctive than Clay-coloreds but have the fortunate habit of emitting a long trill, followed by a brief drop to a distinctly lower frequency. They seem to do this fairly reliably.

Next on my list and higher and drier on the gentle slopes surrounding my targeted wet meadow, were the Grasshopper Sparrows. I'm convinced that Savannah Sparrows occasionally masquerade as Grasshopper Sparrows, but the lack of a short, second trill assured me that I was not probably too far off in chalking up a half dozen or so of the Grasshoppers' insect-like melodies.

With three abundant species and any number of individuals surrounding me, it became a bit strenuous for my mind to follow each song to be sure I didn't miss my lifer. Then as a reward for working so hard, a Field Sparrow mourned from a distant thicket. Amazing how distinct it sounded amid a field of LGB's. Its non-buzzing song provided a breather for my strained cortex.

Then in a quick return to the task of mentally sorting trills from buzzes, I tuned into a Baird's Sparrow. This is a more specialized sparrow of tall-grass prairie and similarly structured grasslands whose song is, without doubt, musical. The field guides are right about this quality. Birders who appreciate subtlety will find it impossible to confuse Baird's musical sauntering with its more ordinary neighbors. And who could confuse that orange median-crown stripe with any other?

Suddenly, from the bulrushes nearly at my feet, came the song of a life bird, but not the one I was looking for. On this June morning its song was just as bizarre as it sounds on my records. In fact I had thought my recording contained some technical error when I first heard this "song" of the Sharp-tailed Sparrow. Although one field guide describes it as a trill, I heard no trilling at all. It's a hard song to describe; it made me

think of Yellow-headed Blackbird songs, although it's not nearly as a loud or as long. But it has that same imitation-defying quality.

I never saw the little runt. He refused to sing more than once about every 10 minutes and clearly preferred to look at the base of bulrushes rather than at a skulking primate.

So it was only half-a-lifer, but I got a whole bird's-worth of thrill out of it.

I had just gotten comfortable with the realization that I would not see the Sharp-tail today, or by all odds, ever, when I finally heard LeConte's. By this time I had heard so many of the other LGB tunes, and the various species had remained faithfully in the "correct" habitats, that I knew immediately what I was hearing.

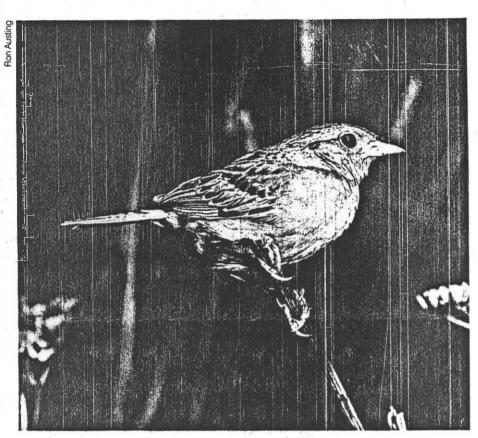
The exceedingly thin, metallic trill came from the upper end of the same wet meadow that harbored the Sharp-tail. Yet the LeConte's was beyond the bulrushes in the shorter grasses. The difference in the songs of LeConte's and Grasshopper Sparrows reminded me of the difference between a Veery and a Gray-cheeked Tirrush, only on a different level.

As I approached more closely the bird rewarded me by flying. I couldn't quite get a good look at him as he flew in a tight circle around me and then vanished back into the grasses. To draw him out, I gave my best imitation of a squeaking baby bird. And up he came again. He flew around me two or three times and plunked back into the morass. I foolishly continued this procedure for 15 or 20 minutes. I have never been so close to a life bird for so long without getting a decent look at it.

Another half-a-lifer.

Leaving these two delicacies of the prairie avifauna in peace, I turned away from the meadow to return to my truck. No matter what happened during the rest of my stay it would be a great day. I had not only found halves of two life birds but also discovered a mecca for LGB's.

Then an unsettling thought occurred to me: I couldn't think of an-



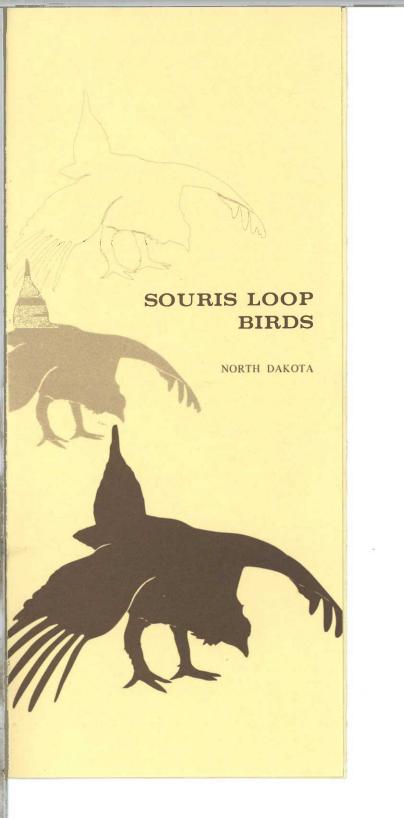
The Grasshopper Sparrow is rather nondescript with its somewhat flat head, the yellow patch above its eyes, and a faintly streaked breast. The grasshopper-like "buzz" that makes up its song is not only the source of its name, but one of the best ways to identify it.

other person who would care. There was one coworker who loved Lostwood but couldn't get past the thought of dropping a Sharp-tailed Grouse there for his Brittany spaniel. I had a friend in town who could appreciate a new life bird, but only if it were bright red or bigger than a bread box. There were several friends out of town who could appreciate the difficulty of finding these two particular life birds, known for their secretive nature and local distribution. But they were seriously into crows and jays, the most intelligent of songbirds, and sparrows just don't have the gray matter to compete.

I finally had to face the fact that nobody I knew would be particularly impressed by what I had just experienced. The reason was clear enough: LGB's just don't have what it takes to arouse interest at a cocktail party. So I tucked the day away in my memory, as I have hidden away poems, written because they had to be written—even if they would never be read.

The next day I ran into several friends on the street. Some were birders, all liked to get outside and do something. One told how he'd gone for a 100-mile bike ride and seen many deer, pronghorn and buffalo. Another had caught a number of walleyes in Lake Sakakawea. A third had spent the day birding along the Little Missouri River and had seen a Bald Eagle, rare and out of season.

"What did you do?" they asked. My enthusiasm surged briefly as the previous day's trills and buzzes came rushing back to me. But then I regained my perspective. Telling them I listened to LGB's all day wouldn't get me far. So I put it this way: I told them I spent the day in a rolling amphitheater where the music was simple, free and unforgettable. And with a smile, I turned and walked away.



#### SOURIS LOOP BIRDS

The "Souris Loop" National Wildlife Refuges were established in 1935. They are Des Lacs (18,881 acres), Lostwood (26,747 acres), J. Clark Salyer (58,695 acres), and Upper Souris (32,092 acres). Wetlands consist of restored marshes on Des Lacs, J. Clark Salyer, and Upper Souris and potholes in the rolling hills on Lostwood. Other important wildlife habitats are remnants of the original short-grass prairie, lowland meadow, wooded sandhills, river bottoms, and coulees.

While the waterfowl concentrations of spring, summer, and fall are spectacular, bird observers are generally most interested in the five species of grebes, white pelicans, certain hawks, grouse, cranes, shorebirds, Franklin's gulls, burrowing owls, Sprague's pipits, lark buntings, longspurs, and sparrows—including Baird's and Le Conte's. About 140 species are known to nest on these refuges.

## CHECKLIST Souris Loop National Wildlife Refuges

This list contains 290 species (23 are accidental species) recorded on the refuges since 1935.

Species nesting on the refuge are indicated by a (•). The relative abundance of each species at each season is coded as follows:

S—March-May F —September-November S—June-August W—December-February

a—abundant common species, very numerous
c—common certain to be seen in suitable habitat
u—uncommon present, but not certain to be seen
o—occasional* seen only a few times during a season
r—rare seen at intervals of 2 to 5 years

### SSFW

Common Loon	r	r	f
• Red-necked Grebe	0	0	0
— • Horned Grebe	U	U	U
• Eared Grebe	c	c	C
—● Western Grebe			
• Pied-billed Grebe	c	c	c
White Pelican	c	c	c
• Double-crested Cormorant	U	U	U
• Great Blue Heron	U	U	U

S	S	F	W

	3	3	. 4	
a Citala Diva Harry				
• Little Blue Heron	U	U	U	
• Cattle Egret	U	U	U	
Great Egret (Common)		r	r	
Snowy Egret		r	r	
Black-crowned Night Heron	c	c	c	
• American Bittern	-			
I Dist	U	U	U	
Least Bittern	r	r	r	
White-faced Ibis		r	r	
Whistling Swan			_	
	U		C	
• Canada Goose	C	U	C	
White-fronted Goose	C		C	
Snow Goose (Snow & Blue)	а		a	
Ross' Goose			r	
• Mallard	a	C	а	
• Black Duck	r	r	r	
• Gadwall	а	C	а	
• Pintail	a	c	a	
• Green-winged Teal		U	U	
	U	-	5	
• Blue-winged Teal	a	C	a	
Cinnamon Teal	r	r		
European Wigeon (European Widgeon)	r	r		
American Wigeon (Am. Widgeon)	c	U	c	
Northern Shoveler (Shoveler)			c	
	c	U		
• Wood Duck	U	U	U	
• Redhead	C	U	C	
• Ring-necked Duck	U	0	U	
• Canvasback	c	U	c	
Greater Scaup.	-			
			r	
• Lesser Scaup	C	U	C	
Common Goldeneye	U		U	
Bufflehead	U	0	U	
• White-winged Scoter	r	r	r	
• Ruddy Duck	c	C	c	
— • Hooded Merganser	0	0	0	
Common Merganser	C		U	
Red-breasted Merganser	U		U	
Turkey Vulture	r			
Goshawk			r r	
• Sharp-shinned Hawk	0	0	0	
Cooper's Hawk	0	0	0	
—• Red-tailed Hawk	c	U	c	
Broad-winged Hawk	0	0	0	
• Swainson's Hawk	c	U	c	
Rough-legged Hawk	0	-	0 0	
		1,00		
• Ferruginous Hawk	0	0	0	
Golden Eagle	0		0 0	
Bald Eagle	0		0	
• Marsh Hawk	c	c	C	
Osprey	r		r	
Gyrfalcon			r	
Prairie Falcon			0 0	
Peregrine Falcon				
	r		r	
— Merlin (Pigeon Hawk)	0		o r	
• American Kestrel (Sparrow Hawk)	U	0	U	

	S	S	F	W
Greater Prairie Chicken (1)				
Sharp-tailed Grouse				
- Ring-necked Pheasant	C	C	C	C
• Gray Partridge	С	С	C	С
Whooping Crane	r		r	
Sandhill Crane (2)	a	r	a	
• Virginia Rail	U	С	U	
• Sora	U	c	U	
• American Coot	c	c	a	
Semipalmated Plover	_			
Bining Blows	U		U	
Piping Plover	0	0	0	
— • Killdeer	С	С	C	
American Golden Plover	U		r	
Black-bellied Plover	U		U	
Ruddy Turnstone	r		r	
• Common Snipe	0	0	0	
Long-billed Curlew	r			
— • Upland Sandpiper (Plover)	U	C	U	
Spotted Sandpiper	U	C	U	
Solitary Sandpiper	U		U	
• Willet	U	U	c	
Greater Yellowlegs	U		c	
Lesser Yellowlegs	c	U	c	
Pectoral Sandpiper	c	c	c	
White-rumped Sandpiper	r		r	
Baird's Sandpiper	U		U	
Least Sandpiper	c	C	а	
Dunlin			r	
Short-billed Dowitcher	r		r	
Long-billed Dowitcher	U	U	c	
Stilt Sandpiper	0		U	
Semipalmated Sandpiper	а	a	а	
Western Sandpiper	r		r	
Buff-breasted Sandpiper	r			
• Marbled Godwit	U	U	С	
Hudsonian Godwit	r		r	
Sanderling	r			
—● American Avocet	c	С	С	
• Wilson's Phalarope	c	c	c	
Northern Phalarope	a		a	
	_			
Herring Gull	r		r	
• California Gull	U	r	U	
— • Ring-billed Gull	C	C	C	
— • Franklin's Gull	C	C	c	
D	-		-	

(1) Last observed in 1956

(2) Nesting recorded at J. Clark Salyer in 1973

 Bonaparte's Gull
 r
 r

 ● Forster's Tern
 c
 c

 ● Common Tern
 u
 u

 ● Black Tern
 a
 c

 ● Rock Dove
 o
 o
 o

 ● Mourning Dove
 c
 c
 a

 Yellow-billed Cuckoo
 r
 e
 Black-billed Cuckoo
 o
 o

Screech Owl Great Horned Owl Snowy Owl Burrowing Owl Short-eared Owl Boreal Owl Saw-whet Owl Common Nighthawk Chimney Swift Belted Kingfisher Common Flicker (Yellow & Red Shafted) Red-headed Woodpecker Yellow-bellied Sapsucker Hairy Woodpecker Downy Woodpecker Say's Phoebe Yellow-bellied Flycatcher Eastern Phoebe Yellow-bellied Flycatcher Willow Flycatcher Willow Flycatcher Eastern Wood Pewee Western Wood Pewee	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Great Horned Owl     Snowy Owl     Burrowing Owl     Iong-eared Owl     Short-eared Owl     Boreal Owl     Saw-whet Owl     Common Nighthawk     Chimney Swift     Ruby-throated Hummingbird     Belted Kingfisher     Common Flicker (Yellow & Red Shafted)     Red-headed Woodpecker     Yellow-bellied Sapsucker     Hairy Woodpecker     Downy Woodpecker     Say's Phoebe     Yellow-bellied Flycatcher     Say's Phoebe     Yellow-bellied Flycatcher     Say's Phoebe     Yellow-bellied Flycatcher     Eastern Wood Pewee     Western Wood Pewee     Western Wood Pewee	U	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0
Great Horned Owl     Snowy Owl     Burrowing Owl     Short-eared Owl     Short-eared Owl     Boreal Owl     Saw-whet Owl     Common Nighthawk     Chimney Swift     Ruby-throated Hummingbird     Belted Kingfisher     Common Flicker (Yellow & Red Shafted)     Red-headed Woodpecker     Yellow-bellied Sapsucker     Hairy Woodpecker     Downy Woodpecker     Say's Phoebe     Yellow-bellied Flycatcher     Say's Phoebe     Yellow-bellied Flycatcher     Eastern Kingbird     Western Kingbird     Say's Phoebe     Yellow-bellied Flycatcher     Eastern Wood Pewee     Western Wood Pewee	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	000000000000000000000000000000000000000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0
Snowy Owl  Burrowing Owl  Short-eared Owl  Short-eared Owl  Saw-whet Owl  Common Nighthawk  Chimney Swift  Ruby-throated Hummingbird  Belted Kingfisher  Common Flicker (Yellow & Red Shafted)  Red-headed Woodpecker  Yellow-bellied Sapsucker  Hairy Woodpecker  Downy Woodpecker  Eastern Kingbird  Western Kingbird  Great Crested Flycatcher  Eastern Phoebe  Say's Phoebe  Yellow-bellied Flycatcher  Eastern Wood Pewee  Western Wood Pewee	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	000000000000000000000000000000000000000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0
Burrowing Owl  Long-eared Owl  Short-eared Owl  Boreal Owl  Saw-whet Owl  Common Nighthawk  Chimney Swift  Ruby-throated Hummingbird  Belted Kingfisher  Common Flicker (Yellow & Red Shafted)  Red-headed Woodpecker  Yellow-bellied Sapsucker  Hairy Woodpecker  Downy Woodpecker  Eastern Kingbird  Western Kingbird  Great Crested Flycatcher  Eastern Phoebe  Yellow-bellied Flycatcher  Eastern Phoebe  Yellow-bellied Flycatcher  Eastern Wood Pewee  Western Wood Pewee	0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 .	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0
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Chimney Swift  Ruby-throated Hummingbird  Belted Kingfisher  Common Flicker (Yellow & Red Shafted)  Red-headed Woodpecker  Yellow-bellied Sapsucker  Hairy Woodpecker  Downy Woodpecker  Eastern Kingbird  Western Kingbird  Great Crested Flycatcher  Eastern Phoebe  Yellow-bellied Flycatcher  Eastern Phoebe  Yellow-bellied Flycatcher  Eastern Wood Pewee  Western Wood Pewee	. 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0
Chimney Swift  ORUBY-throated Hummingbird  Belted Kingfisher  Common Flicker (Yellow & Red Shafted)  Red-headed Woodpecker  Yellow-bellied Sapsucker  Hairy Woodpecker  Downy Woodpecker  Eastern Kingbird  Western Kingbird  Great Crested Flycatcher  Eastern Phoebe  Yellow-bellied Flycatcher  Willow Flycatcher  Least Flycatcher  Least Flycatcher  Eastern Wood Pewee  Western Wood Pewee	. r . o . o . c . r . o . o . u . a . r . r . o . o r . r . o . o r . r	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	
Ruby-throated Hummingbird      Belted Kingfisher      Common Flicker (Yellow & Red Shafted)      Red-headed Woodpecker      Yellow-bellied Sapsucker      Hairy Woodpecker      Downy Woodpecker      Eastern Kingbird      Western Kingbird      Great Crested Flycatcher      Eastern Phoebe      Say's Phoebe      Yellow-bellied Flycatcher      Willow Flycatcher      Eastern Wood Pewee      Western Wood Pewee	. o . o . c . r . o . o . u . u . a . r . r . o .	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	
Belted Kingfisher      Common Flicker (Yellow & Red Shafted)      Red-headed Woodpecker      Yellow-bellied Sapsucker      Downy Woodpecker      Eastern Kingbird      Great Crested Flycatcher      Eastern Phoebe      Yellow-bellied Flycatcher      Willow Flycatcher      Willow Flycatcher      Eastern Wood Pewee      Western Wood Pewee	. o . c . r . o . o . u . r . r . o	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	
Belted Kingfisher      Common Flicker (Yellow & Red Shafted)      Red-headed Woodpecker      Yellow-bellied Sapsucker      Downy Woodpecker      Eastern Kingbird      Great Crested Flycatcher      Eastern Phoebe      Yellow-bellied Flycatcher      Willow Flycatcher      Willow Flycatcher      Eastern Wood Pewee      Western Wood Pewee	. o . c . r . o . o . u . r . r . o	0 0 0 0 0 0 0 0 0 0 0	C	
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Red-headed Woodpecker     Yellow-bellied Sapsucker     Hairy Woodpecker     Downy Woodpecker     Eastern Kingbird     Great Crested Flycatcher     Eastern Phoebe     Yellow-bellied Flycatcher     Willow Flycatcher     Least Flycatcher     Eastern Wood Pewee     Western Wood Pewee	. r . o . u . a . r . r . o	0 0 0 0 0 0 0 0	r 0 0 U C C 0	
Yellow-bellied Sapsucker     Hairy Woodpecker     Downy Woodpecker      Eastern Kingbird     Great Crested Flycatcher     Say's Phoebe     Yellow-bellied Flycatcher     Willow Flycatcher     Least Flycatcher     Eastern Wood Pewee     Western Wood Pewee	. o . o . u . u . a . a . r . r . o	0 0 0 0 0	0 0 0 0 0 0	
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• Eastern Kingbird     • Western Kingbird     • Great Crested Flycatcher     • Eastern Phoebe     • Say's Phoebe     • Yellow-bellied Flycatcher     • Willow Flycatcher     • Least Flycatcher     • Eastern Wood Pewee     • Western Wood Pewee	. a . r . r	c c o	c c	U
Western Kingbird     Great Crested Flycatcher     Eastern Phoebe     Say's Phoebe     Yellow-bellied Flycatcher     Willow Flycatcher     Least Flycatcher     Eastern Wood Pewee     Western Wood Pewee	. a . r . r	0	0	
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Great Crested Flycatcher      Eastern Phoebe      Say's Phoebe      Yellow-bellied Flycatcher      Willow Flycatcher      Least Flycatcher      Eastern Wood Pewee      Western Wood Pewee	. r . r	0	0	
<ul> <li>Eastern Phoebe</li> <li>Say's Phoebe</li> <li>Yellow-bellied Flycatcher</li> <li>Willow Flycatcher</li> <li>Least Flycatcher</li> <li>Eastern Wood Pewee</li> <li>Western Wood Pewee</li> </ul>	. r	0		
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e Least Flycatcher e Eastern Wood Pewee Western Wood Pewee		·	a	
• Eastern Wood Pewee		c	a	
Western Wood Pewee		0	0	
			1	
Olive sided Elementals as				
Olive-sided Flycatcher			U	_
• Horned Lark	. a	c	а	C
Violet-green Swallow			r	
• Tree Swallow	. с	С	а	
• Bank Swallow		c	а	
• Rough-winged Swallow	. 0	0	0	
• Barn Swallow		C	α	
• Cliff Swallow		а	а	
• Purple Martin		c	c	
• Blue Jay		0	0	_
		U	U	
Black-billed Magpie		U	U	r
Raven				
• Common Crow		U	C	
• Black-capped Chickadee	. с	C	c	C
• White-breasted Nuthatch	. 0	0	0	0
Red-breasted Nuthatch	. u		c	r
Brown Creeper			u	r
				-
—_• House Wren		C	c	
• Long-billed Marsh Wren		C	c	
Short-billed Marsh Wren		C	U	
• Rock Wren	. r	r	r	
		r	r	
Mockingbird	. r		U	
— • Gray Catbird (Catbird)	. r	U		
	. r		U	
• Gray Catbird (Catbird)	. r		r	

SSFW

	S	S	F	W
• American Robin (Robin)	c	c	a	0
— Hermit Thrush	U		U	•
Swainson's Thrush	c		c	
Gray-cheeked Thrush	c		c	
• Veery	U	c	U	
• Eastern Bluebird	0	0	0	
Mountain Bluebird	U	r	U	
Townsend's Solitaire	r		r	r
Golden-crowned Kinglet	U	_		_
Ruby-crowned Kinglet	U		U	
	0		_	_
— Water Pipit	U		U	
• Sprague's Pipit	U	U	0	
Bohemian Waxwing	U		U	U
• Cedar Waxwing	c	c	c	r
Northern Shrike				0
• Loggerhead Shrike	U	U	U	
				_
• Starling	U	U	U	U
Yellow-throated Vireo	0	0	0	
Solitary Vireo	r	r	r	
e Red-eyed Vireo	c	c	c	
	0	0	0	
• Warbling Vireo	C	C	c	_
Black-and-white-Warbler	U	0	U	
Tennessee Warbler	c		c	
Orange-crowned Warbler	c		c	
Nashville Warbler			r	
• Yellow Warbler	c	c	a	
Magnolia Warbler	0		0	
Cape May Warbler	r		r	
Black-throated Blue Warbler	r		r	
Yellow-Rumped Warbler				
(Myrtle & Audubon's)  Black-throated Green Warbler	c		c	
-1 11 . 14/ 11	0	0	0	
	0	0	0	
	0	0	_	
Blackpoll Warbler	0	0	U	
Palm Warbler	0		0	
• Ovenbird	U	0	U	
• Northern Waterthrush	c	U	c	
Connecticut Warbler	r		r	
Mourning Warbler	U	0	U	
MacGillivray's Warbler	0	0	0	
• Common Yellowthroat (Yellowthroat)	c	c	c	
• Yellow-breasted Chat	0	0	0	
Wilson's Warbler	U	U	c	
Canada Warbler	r		0	
American Redstart	U	U	U	
• House Sparrow	c	c	c	c
	_			_
• Bobolink	c	c	c	_
— • Western Meadowlark	a	a	a	r
Yellow-headed Blackbird	a	a	a	
• Red-winged Blackbird	a	а	a	0

	2	2	r	W
Orchard Oriole	0	0	0	
Northern Oriole (Baltimore & Bullock's)	U	U	U	
Rusty Blackbird		٠		
Brewer's Blackbird	U		U	
	U	U	U	
• Common Grackle	C	C	C	r
• Brown-headed Cowbird	С	C +	С	
Western Tanager			r	
Scarlet Tanager	r	r		
• Rose-breasted Grosbeak				_
	0	r	U	
Black-headed Grosbeak	r			
Indigo Bunting	r	r		
• Lazuli Bunting	0	0		
• Dickcissel	r	r	r	
Evening Grosbeak	r		r	r
Purple Finch	U		U	r
Pine Grosbeak				C
Hoary Redpoll				r
Common Redpoll	c			c
Pine Siskin	c	r	c	r
American Goldfinch	c	c	а	r
Red Crossbill	r	r	r	r
White-winged Crossbill	Ů.		-	r
• Rufous-sided Towhee	U	c		
• Lark Bunting .	c	a	c	
Savannah Sparrow				
Grasshopper Sparrow	C	a	а	
	U	C	U	
Baird's Sparrow	U	C	U	
• Le Conte's Sparrow	U	c	U	
Sharp-tailed Sparrow	U	c	U	
• Vesper Sparrow	U	U	U	
• Lark Sparrow	0	0		
Dark-eyed Junco (Slate-colored, Oregon				
& White-winged)	а		а	r
Tree Sparrow	а		а	r
• Chipping Sparrow	c	U	C.	
OClay-colored Sparrow	а	a	C	
• Field Sparrow	0	0	0	
Harris' Sparrow	C		c	r
White-crowned Sparrow	c		С	
White-throated Sparrow	a		c	
Fox Sparrow	U		U	
Lincoln's Sparrow	c		c	
Swamp Sparrow	0		0	
• Song Sparrow	c	c	c	
- • McCown's Longspur		r	r	
Lapland Longspur	r		a	c
	a			c
	0		0	
Chestnut-Collared Longspur	C	C	U	
Snow Bunting	C		C	а

BIRDS THAT ARE RARELY SEEN ON THE REFUGES AND OUT OF THEIR NORMAL RANGE:

Green Heron Black-necked Stilt Barn Owl White Ibis Barred Owl **Fulvous Whistling Duck** Whip-poor-will Oldsquaw Scissor-tailed Flycatcher Harlequin Duck Winter Wren **Surf Scoter** Northern Parula Common Scoter Townsend's Warbler Red-shouldered Hawk **Hooded Warbler** Bobwhite Lesser Goldfinch American Woodcock Henslow's Sparrow Whimbrel

Acknowledgments: To Dr. and Mrs. R.T. Gammell for their contribution in compiling this birdlist.

Further information about the refuges or certain species can be obtained from:

Des Lacs Refuge Kenmare, North Dakota 58746

J. Clark Salyer Refuge Upham, North Dakota 58789

Upper Souris Refuge Foxholm, North Dakota 58738

RR 2 Kenmare, North Dakota 58746

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE



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Lostwood NATIONAL WILDLIFE REFUGE

## LOSTWOOD NATIONAL WILDLIFE REFUGE

Lostwood National Wildlife Refuge lies in the highly productive prairie pothole region that produces more ducks than any other region in the lower 48 states. The Refuge is a land of rolling hills mantled in short- and mid-grass prairie interspersed with numerous wetlands. Established to preserve a unique wildlife habitat, Lostwood is an important link in our nation's system of more than 390 Wildlife Refuges.



Drawing of a pair of Pintail ducks.

### FROM ICE TO MANTLES OF GRASS

Ten thousand years ago, the last glacier had to climb a steep topographical rise, the "Missouri Escarpment", to continue its southwesterly path over the area now known as Lostwood Refuge. The climbing ice pushed tons of material, "glacial drift", ahead of it and deposited it just beyond the escarpment.

When the ice began to melt, glacial drift became concentrated on the ice surface and acted as an insulator to the ice beneath. As a result, the drift area retained ice long after it had disappeared from the rest of northwestern North Dakota.

Slowly, the surface of the drift-covered ice warmed, producing forests of spruce, tamarack, birch and poplar along with a myriad of lakes,

wetlands and streams. As the ice melted beneath, the drift settled creating rocky rolling hills with numerous shallow lakes and wetlands known today as the "Missouri Coteau".

As precipitation slowly decreased, forest gave way to mantles of grass. Lakes and wetlands evolved into highly productive duck hatcheries producing millions of birds every year. Bison, elk, prairie chicken, sharp-tailed grouse, grizzly bear, and wolf were also abundant.

### PRESERVING A PRAIRIE HERITAGE

Settlers were spurred into western North Dakota by the Homestead Act of 1862, but they did not immediately settle in Coteau because it was difficult to farm and they dreaded the wild prairie fires. Consequently most tracts were not settled until the early 1900s.

As man "tamed" the area, wild fires were contained and eventually stopped altogether. Wetlands were drained to increase the number of tillable acres. Less desirable "brush" slowly encroached into the fireless grassland and water-dependent wildlife lost habitat.

In order to preserve our prairie heritage, Lostwood National Wildlife Refuge was established on September 4, 1935, "...as a refuge

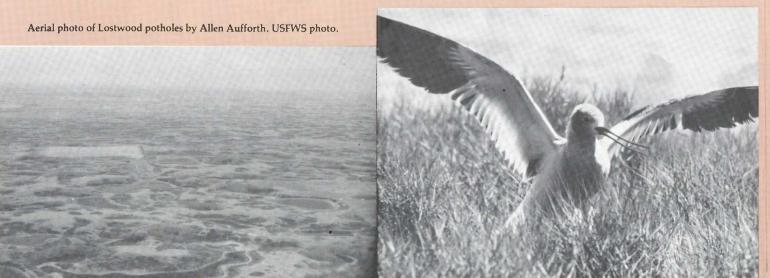


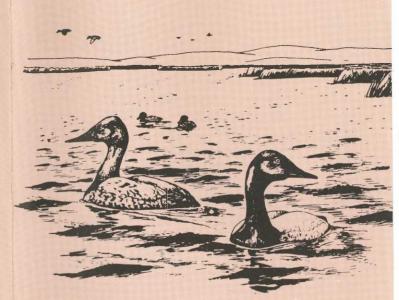
Wilson's Phalarope, photo by Karen Smith.

and breeding ground for migratory birds and other wildlife...." Encompassing 26,747 acres, the Refuge is a remnant of the original prairie, although small acreages have been farmed. Fortunately, most of the wetlands remain intact, much as they were before settlement.

Congress acted further to guarantee our prairie heritage by establishing the 5,577 acre Lostwood Wilderness Area in 1975. Under wilderness management guidelines the use of natural or controlled fire to maintain and preserve native prairie is fully recognized.

Avocet. USFWS photo.





Drawing of a pair of Canvasback ducks.

### FEATHERS AND FUR

Waterfowl and other water dependent birds are highlights on the Refuge. Blue-winged teal, mallard, gadwall and wigeon occur in significant numbers while lesser scaup, redhead and canvasback are also present. Others, such as Virginia rail, marbled godwit and American avocet wade in the fertile wetlands.

LeConte's sparrow, Baird's sparrow and Sprague's pipit sing profusely to warn others of their species to stay off their home territories. In early spring, sharp-tailed grouse engage in elaborate courtship rituals on numerous dancing grounds.

Giant Canada geese, once thought to be extinct, again nest on the prairie. The majestic birds were reintroduced to their native habitat on the Refuge in 1964.

Whitetail deer, muskrat, badger, mink, weasel, and whitetail jackrabbit are common. Encroaching brush and aspen attracted the eastern cottontail, snowshoe hare, beaver, and porcupine. The howl of the wolf, however, has given way to the yodel of the coyote and the yap of the fox.

### MAINTAINING NATIVE HABITAT

Prior to settlement, North Dakota's native grasslands thrived under constant disturbances such as drought, flood, fire, and massive herds of bison. The prairie was predominantly composed of native grasses, forbs, and snowberry, a brush species occupying 1 to 3% of the prairie. By the 1970's, snowberry composed 50 to 80% of the prairie, and exotic grasses such as Kentucky bluegrass and smooth brome had invaded the native grassland.

The area today remains subject to drought, flood and wind as it did in the past. Cattle have replaced bison under carefully controlled conditions. Why then, does the less desirable brush continue to spread? Fire and concentrations of grazing animals are missing. As a management tool, fire, is preferred over grazing because fire reduces snowberry, eliminates exotic grasses and stimulates native grasses and forbs. Grazing alone does not accomplish these objectives.

Prairie wetlands are managed by nature. It is as important for prairie wetlands to go dry as it is for them to be filled with water. During droughts, the bottom of wetlands are exposed to the elements, permitting decomposition of organic material. Without the dry cycle, oxygen in the water would be used to decompose the organic material. The oxygen depleted wetland would no longer support aquatic invertebrates, the prime food for ducks and shorebirds. So the dry cycle maintains the high productivity of the prairie wetlands.

Controlled burning photo by Ken Higgins. USFWS photo.





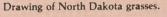
All illustrations by Karen Smith.

### EXPERIENCE THE ESSENCE OF LOSTWOOD

Unique wetland environments are found over every hill on the Lostwood National Wildlife Refuge.

Vehicle and hiking trails provide access for the visitor during portions of the spring, summer and fall. The wilderness area offers hiking during certain months, as well as snowshoeing and cross-country skiing. Extreme caution must be used in winter because subzero temperatures and strong winds have no mercy.

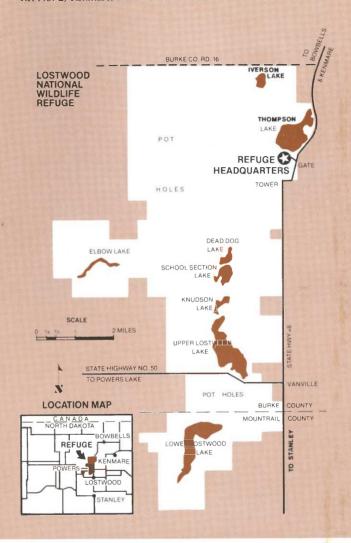
Regulations concerning wildlife recreational opportunities and hunting programs are available at Refuge Headquarters located off State Highway No. 8.





#### **ADMINSTRATION**

The Refuge is administered as a part of the Des Lacs Complex with the main office located one mile west of Kenmare, North Dakota. The Lostwood Headquarters, which administers the Lostwood Refuge, is located 12 miles west of Kenmare on Ward County road No. 2 and 4 miles south on Highway No. 8. Inquiries for information should be addressed to the Refuge Manager, Lostwood National Wildlife Refuge, RR No. 2. Kenmare. North Dakota 58746.



### U.S. FISH AND WILDLIFE SERVICE Department of the Interior





\* GPO 1979-680-985